ANC

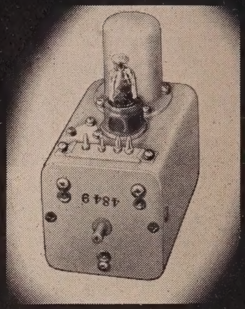
CQ RADIO AMATEURS' JOURNAL

SEPTEMBER 1953

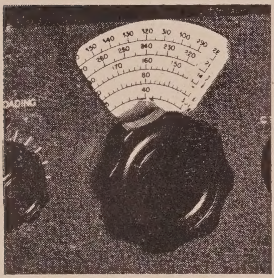
35c

A self-contained table-top transmitter —

COLLINS 32V-3



Pick your frequency with the built-in 70E-8 VFO



You can count the kilocycles on the 32V-3 dial

- With this popular transmitter you QSY from the high end of 10 to the low end of 80 in a few seconds; just pick your band and set the built-in VFO to the desired spot. The 32V-3 will stay there — its frequency is controlled by the highly stable, built-in 70E-8 VFO.
- Have you ever wondered why the 32V-3 sounds so powerful on phone? It's because the audio circuits are Collins-designed and Collins-built for peak performance at speech frequencies.
- And, of course, spurious radiation has been reduced to an absolute minimum.
- The Collins 32V-3 runs 160 watts on cw and 140 watts on phone.

See your Collins distributor today for information on this popular transmitter.

For the best in amateur equipment, it's . . . COLLINS

COLLINS RADIO COMPANY, Cedar Rapids, Iowa

11 W. 42nd St., NEW YORK 36
1930 Hi-Line Drive, DALLAS 2
2700 W. Olive Ave., BURBANK

Again, for 1953

THE EDISON RADIO AMATEUR AWARD

The Award Committee solicits your nominations for 1953 candidates

PRESENTED TO
WINNER OF THE
1953 EDISON RADIO AMATEUR AWARD
IN RECOGNITION OF
OUTSTANDING PUBLIC SERVICE
TUBE DEPARTMENT
GENERAL ELECTRIC

Here is your opportunity to spotlight the meritorious work of a radio amateur you may know who has served the public by means of his hobby. Enter his name for the Edison Award.

You will be promoting the best interests of amateur radio, and you can win for yourself an expense-paid trip to the city where the Award will be presented. Judges will consider only amateurs who are nominated by your letters.

1952 saw Don Mullican, W5PHP, receive the Edison Award as a result of his outstanding work in the March tornado disasters in Arkansas. Special citations also were given four other amateurs who performed especially notable services.

The acclaim for these five was a tribute to the important and unselfish efforts of amateurs everywhere. The 1953 Award will bring recognition to a new trophy winner—will once more dramatize amateur radio's achievements in the public interest.

Read the rules at right. Then select your candidate . . . and send your letter of nomination to *Edison Award Committee, Tube Department, General Electric Company, Schenectady 5, New York.*

RULES OF THE AWARD

WHO IS ELIGIBLE: any man or woman holding a radio amateur's license issued by the F.C.C., Washington, D. C., who in 1953 performed a meritorious public service in behalf of an individual or group. The service must have been performed while the candidate was pursuing his hobby as an amateur within the continental limits of the United States.

WINNER OF THE AWARD will receive the Edison trophy in a public ceremony in a centrally located metropolitan city. Expenses of his trip to that city will be paid. As a further token of appreciation, G.E. will present him with a precision chronographic watch to clock DX. In addition, the person responsible for the nomination of the Award-winning candidate will be invited to attend the presentation ceremony, and his expenses also will be paid.

WHO CAN NOMINATE: any individual, club, or association familiar with the service performed.

HOW TO NOMINATE. Include in a letter the candidate's name, address, call letters, and a full description of the service performed. Your letter must be postmarked not later than January 3, 1954.

BASIS FOR JUDGING. All entries will be reviewed by a group of distinguished and impartial judges. Their decisions will be based on (1) the greatest benefit to an individual or group, (2) the amount of ingenuity and sacrifice displayed in performing the service. The judges will be:

E. ROLAND HARRIMAN
President, The American Red Cross

GEORGE E. STERLING
Commissioner, Federal Communications Commission

GOODWIN L. DOSLAND
President, American Radio Relay League

GARDNER COWLES
President and Editor, "Look" Magazine

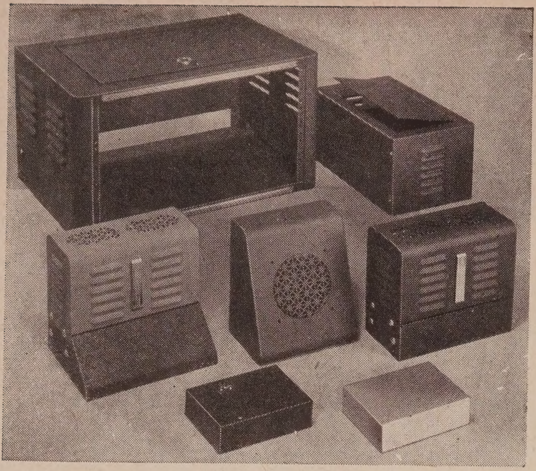
WINNER WILL BE ANNOUNCED on or before Thomas A. Edison's birthday, February 11, 1954.

Employees of the General Electric Company may nominate candidates for the Edison Radio Amateur Award, but are not permitted to receive the Award.

GENERAL ELECTRIC

166-1B9

1878 75 1953
YEARS OF ELECTRICAL PROGRESS
Diamond Anniversary



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Compare the Cost

and you'll choose

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Your amateur or commercial electronic equipment will look better, operate more efficiently and last longer when you use Bud Sheet Metal Products as the basis of construction. Since Bud makes over 400 different types and sizes of sheet metal products, you're sure to find exactly what you want in the extensive Bud line.

The high quality of Bud products is the result of over 25 years of experience in supplying the needs of the electronic industry. Our engineering background and production facilities enable us to give you the finest quality at prices no higher than ordinary merchandise.

Illustrated are a few of the Bud Sheet Metal Products. You can choose from a wide variety of Racks, Panels, Chassis, Cases, Cabinets and accessories and be sure of getting outstanding beauty, durability and utility.

See the Bud line at your nearest distributor's sales room. He will be glad to recommend the proper part to do the right job for you.

You can't afford to pay more for less quality. Don't accept substitutes. Insist on Bud.

BUD — THE MARK OF PERFECTION

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CQ RADIO AMATEURS' JOURNAL

Vol. 8, No. 9
SEPTEMBER, 1953

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Cover Photograph

One good reason for KH6FAA's potent punch—three elements on 14 Mc. and four on 28 Ms., towering over everything else in the vicinity. Air Force MATS photo.

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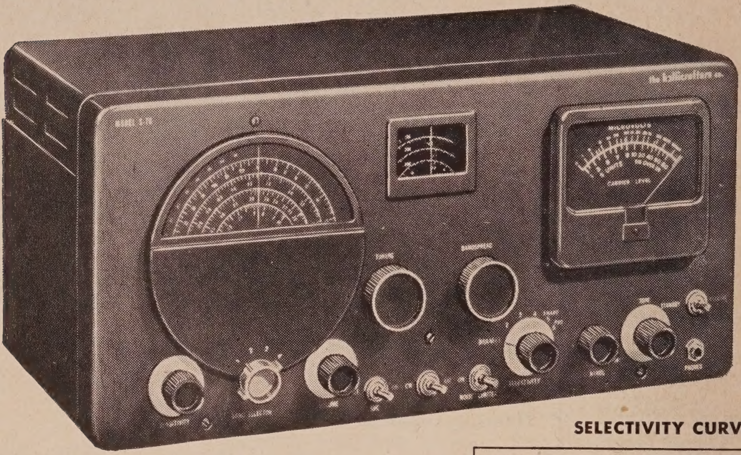
Check the specs...
Check the performance...

AND YOU'LL CHOOSE

Do you know any better way, any other way, to judge SW equipment than to check the specifications and the performance? Frankly that's the only valid way we can think of to make sure you get your money's worth. Check these specs. Take a look at the selectivity curve for the S-76. It is typical of the outstanding value Hallicrafters offers in every price class.



Model S-76

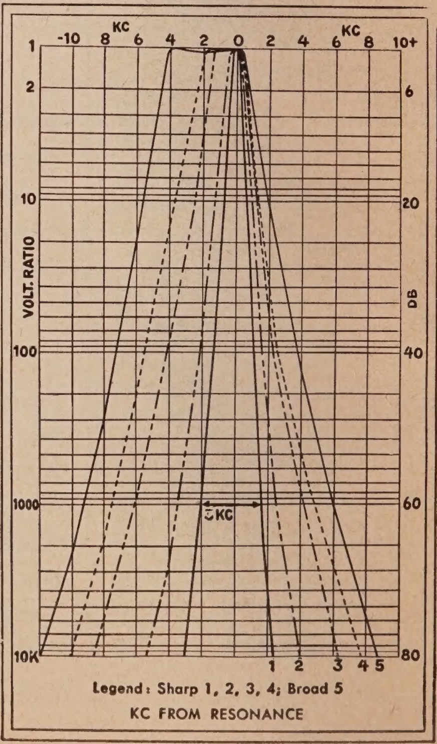
Double conversion receiver. Broadcast Band 538-1580 kc plus three short-wave bands covering 1720 kc-34 Mc.

Calibrated electrical bandspread for easy tuning. Double superhet with 50 kc second i-f and giant 4-inch "S" meter. Five position selectivity, one r-f, two conversion, two i-f stages, temperature compensated. 3.2 or 500 ohm outputs.

Satin black steel cabinet. 18½" x 8⅞" x 9½" deep. Nine tubes, plus voltage regulator and rectifier.

For 105/125V. 50/60 cycle AC
Use R-46 speaker $199.95

SELECTIVITY CURVES, S-76



hallicrafters

Model HT-20. T.V.I. suppressed 100 watt AM-CW transmitter with all spurious outputs above 40 Mc at least 90 db. below full rated output.

All stages metered; single meter with eight position meter switch; output tuning indication. Frequency range of 1.7 Mc to 31 Mc continuous on front panel control. Seven tubes plus five rectifiers.

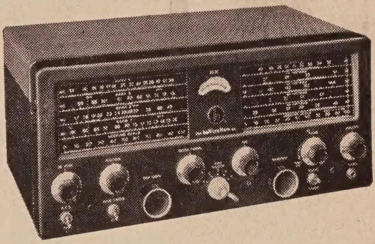
For 105/125 V. 50/60 cycle AC. **$449.50**

Model SX-71. Covers Broadcast Band 535-1650 kc plus four short-wave bands covering 1650 kc-34 Mc and 46-56 Mc.

Built-in Narrow Band FM one r-f, two conversion, and three i-f stages. Temperature compensated, voltage regulated. Three watt output (terminals for 500 and 3.2 ohms).

Satin black steel cabinet. 18½" x 8⅞" x 12" deep. Eleven tubes plus regulator, rectifier.

For 105/125 V. 50/60 cycle AC. . . **$249.95**



Models S-40B, S-77A. Covers Broadcast Band 540-1680 kc plus three short-wave bands covering 1680 kc-44 Mc.

Electrical bandspread for easy tuning. One r-f, two i-f stages to draw in stations. Switches for automatic noise limiter, code reception and three-position tone control. CW pitch control and built-in speaker. Seven tubes plus rectifier.

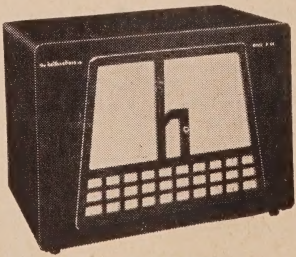
S-40B For 105/125 V. 50/60 cycle AC **$129.95**

S-77A Same, for 105/125 V. AC/DC

32 lbs. **$129.95**

Model R-46. Matching 10" PM speaker for use with Hallicrafters communications receivers SX-71, SX-76, SX-73 or SX-62. 80 to 5000 cycle range. Matching transformer with 500-ohm input. Speaker voice coil impedance, 3.2 ohms.

Satin black steel cabinet matches all Hallicrafters receivers. Cloth covered metal grille. 15" x 10⅞" x 10⅞" deep. Shipping weight 17 lbs. **$24.95**



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World's Leading Exclusive Manufacturer of Communications and High Fidelity Equipment, Radio and Television

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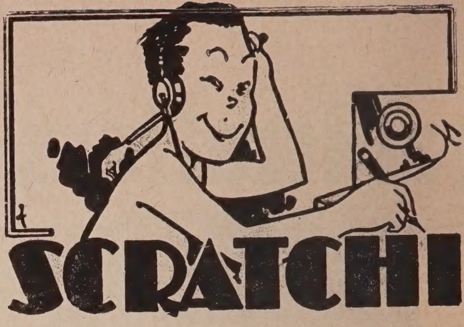
Designed for

Application

The No. 80070 Series of Cathode Ray Tube Bezels

The MILLEN "Designed for Application" line of plastic and cast aluminum panel bezels includes units for the 1″, 2″, 3″ and 5″ tubes. The 5″ size is also available with a special neoprene cushion for the new flat faced tubes as well as the standard cushion. The finish on all types, either metal or plastic is a handsome flat black. The 2″, 3″ and 5″ sizes include a green plexiglass filter. Mumetal and nicoloi shields are also available for all types of cathode ray tubes for use with any of these bezels.

JAMES MILLEN
MFG. CO., INC.
MAIN OFFICE AND FACTORY
MALDEN
MASSACHUSETTS



Feenix, Ariz.

Deer Hon. **Ed:**

Please quicklike and in 1/c hurry putting this ad in next issue of your Hon. Mag:

WANTED—Call and QTH of VS4 amchoor living in south of North Borneo having handle of Mumbo Jumbo. Many bux reward. Contacting Scratchi airmale posthasty.

This are extreamly important, Hon. Ed., so I not enclosing any money, as knowing you putting in free from charging on so important as this. You seeing, hole State of Arizona may be . . . . but I getting away from in front of behinding story.

Cupple Sunnays ago I sitting in shack, having qso's on fourteen megacackle band, when hooking up with this VS4. Band are wide open, and he cuming thru like Mac's truck, so we chewing rag. He are sum card, Hon. Ed. He telling me he witch doctor in big Borneo tribe, and how amchoor rig reely making him topside witch doctor.

I are getting so much amoosing from this character that I calling for Hon. Brother Itchi. He cuming in shack and listening, and finally I putting him on mike. He telling Mumbo Jumbo abouts the wether, and how dry Arizona being, and how having practikally no rain for many months.

It true enuf, but Itchi reely laying it on. He saying how carrots he growing cuming up already dehydrated, how getting only dust when turning on fawcet, and how we all so dry we having to putting stamps on letters with glue on acct. can't even licking them.

Mumbo Jumbo cuming back and saying he so sorry we having no rain, but if I turning up volume on receever he fixing, on acct. he knowing red hots rain prayer. When he saying this, Brother Itchi and I laffing like furies. Boy, are this guy humorus. Rain! Hah. Outside having blue skys like sixty, with not a cloud in sites for eleventeen miles (that are beyond horizon, Hon. Ed.).

I going back to this VS4, telling him having receever volume up full, and to letting go. Are having hard time keeping from laffing. So, Old Mumbo Jumbo starts to clicking sum bones together, and making grunts and odd noises, then he starts singing. Sounds like 78 rpm record run at 45 rpm. Boy, Hon. Ed., it were lowdown. Brother Itchi and I laffing so hard we almost missing sine-off, but Mumbo are saying he gotta run, as having new

(Continued on page 8)

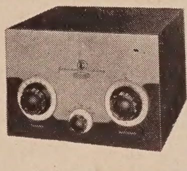
EVERYTHING FOR A 5 BY 9+ SIGNAL

MEDIUM POWER—TVI SUPPRESSED—A COMPLETE TRANSMITTING PACKAGE FOR LESS THAN $400

VIKING II TRANSMITTER

TVI suppressed. All amateur bands from 10 to 160 meters. 100 watts phone output, 130 watts CW. Instant bandswitching with VFO input provision and dual power supplies. All stages metered. Pi-network coupling output amplifier. Self contained—no plug-in coils. 100% amplitude modulation.

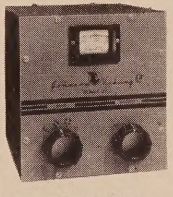
240-102 VIKING II TRANSMITTER KIT, COMPLETE WITH TUBES, LESS CRYSTALS, KEY AND MIKE. AMATEUR NET **$279.50.** AVAILABLE WIRED AND TESTED, **$337.00** AMATEUR NET.



JOHNSON "MATCHBOX"

A fully engineered antenna coupling system, the "Matchbox" will load an almost infinite variety of antennas from 3.5 to 30.0 mcs. Matches balanced antennas from 25 to 1200 ohms resistance. Successfully loads unbalanced, or single wire antennas of approximately 25 to 3000 ohms resistance. Tunes out large amounts of reactance. Easy to use, front panel controls—no internal adiustments required to change bands.

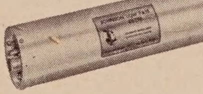
250-23 JOHNSON "MATCHBOX", ASSEMBLED, WIRED AND TESTED, **$49.85** AMATEUR NET.



VIKING VFO

Accurately calibrated for all amateur bands from 10 to 160 meters. Excellent stability, vernier tuning, clean keying, and perfect "break-in" on all bands.

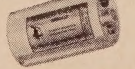
240-122 VIKING VFO KIT COMPLETE, LESS TUBES, **$42.75** AMATEUR NET. AVAILABLE WIRED AND TESTED, **$63.75** AMATEUR NET.



LOW PASS RF FILTER

Consists of four individually shielded sections, capable of handling more than 1000 watts amplitude modulated RF. Provides an additional 75 db harmonic attenuation in the antenna circuit. SO-239 coaxial connectors, completely assembled and pre-tuned.

250-20 LOW PASS RF FILTER, **$16.50** AMATEUR NET.



SWR BRIDGE

Provides accurate measurements of standing wave ratios and insures the most effective use of a low pass filter and antenna coupler for the ultimate in TVI suppression. Impedance of 52 ohms can be changed to 70 ohms or other desired value. Equipped with SO-239 connectors and polarized meter jacks.

250-24 SWR BRIDGE, **$9.75** AMATEUR NET.

TOWER AND BEAM PHOTO—COURTESY OF W0EDX

During the 19th annual ARRL Sweepstakes, W0EDX rolled up 108,972 points with 505 exchanges in all 72—to win top 'phone honors and the distinction of being the only entrant to tally a six-digit score. Johnson equipment in use by W0EDX: Viking II, Viking VFO, "Matchbox", Low Pass Filter, SWR Bridge, Rotomatic Rotator, and Automatic Dual Beam Antenna.

E. F. JOHNSON COMPANY

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AMATEUR ANTENNA
TWIN-LEAD AMATEUR ANTENNA
AMPHENOL

for TOP performance in AMATEUR COMMUNICATIONS

use an AMPHENOL TWIN-LEAD

Folded Dipole Antenna

Assemble it yourself and save!

The Amphenol Ham Antenna was designed by engineers, many of whom operate their own amateur radio equipment, with one specification in mind: an efficient antenna for amateur use—at a reasonable cost. Testifying to their success are the thousands of amateurs now using this quality antenna.

The Amphenol Ham Antenna comes in four models: 10, 20, 40 and 80 meters. Full information is included with each antenna on how to cut the antenna to a specific frequency.

The complete kit includes:

2 lengths of #16 copper-clad steel conductor twin-lead, cut to band length.
1 75-foot length of standard 300 ohm twin-lead for use as lead-in.
1 high strength laminated T-block.
Assembly and installation instructions.

AMATEUR NET

10 meters	$5.35	40 meters	$ 7.80
20 meters	6.00	80 meters	11.25

see your
AMPHENOL
radio parts distributor

AMERICAN PHENOLIC CORPORATION

(from page 6)

patient in waiting room, and he hoping we getting enuf rain.

After that qso, Itchi are all for trying to find sum other humorus amchoor, but by that time QRN getting kinda bad, so I turning off receever. Are noting that room getting darker, which not seeming rite for middle of afternoon. Going outside, and looking at sky. Sacremento Boulevard!! Hon. Ed., it are as dark as inside of two-bit telescope. I calling Itchi, and he cuming to door just as first rain drops fall. They are same size as silver dollars. Itchi looking at Scratchi, and Scratchi looking at Itchi, and we both shrugging shoulders.

Maybe you reeding about that storm we having, Hon. Ed. Hole city of Feenix are practikally floating. Places on desert getting so wet they look like mirage, only not being mirage, being reel. Brother Itchi's wells so full he having to reversing pumps to keeping water in. It are fablus.

Next day Itchi and I having long talk, and finely we deciding maybe Mumbo Jumbo having sumthing. So, we figuring we contacting him again, only this time having receevers all over state listening in. If that working, Sratchi being hero. Itchi calling up guvner of state, and Hon. Guvner saying he try anything once, and he will arranging for receevers after we making skedyule with Mumbo Jumbo.

Next afternoon, brite and early, Hon. Brother Itchi and I in shack, and I tooning over 14 megacackle band like crazy. One hour, then two hour, and still no Mumbo Jumbo. Itchi finely asking why not I calling good old M. J. I telling Itchi I be more than happier to, only not keeping log, and not knowing Mumbo Jumbo's call.

So you can seeing what a stewpendus spot Scratchi in, Hon. Ed. Last cupple days Scratchi keeping 24 hour watch on band, but no Mumbo Jumbo on air. Scratchi can be practikally a hero by being Arizona's number one witch doctor, but can't locating selfsame old M. J. So, being reel fine gentlefellow and printing ad for Scratchi immeedjutly. Who knows, you may be needing water yourself sum day soon, even if only for chaser, and Mumbo Jumbo the man that can help.

Respectively yours,
Hashafisti Scratchi

"BOY IF I CAN ONLY GET HER FREQUENCY."

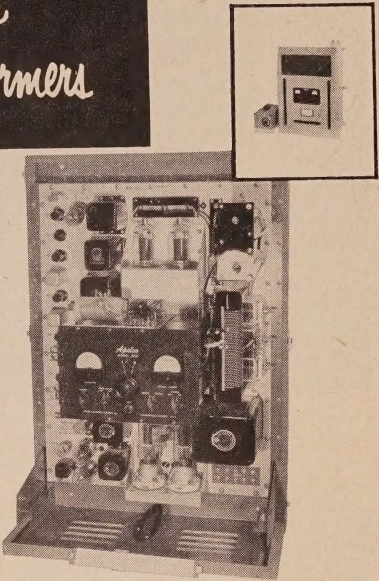
ALL-WEATHER COMMUNICATION DEMANDS

Precision AND Dependability

THAT'S WHY THE APELCO RADIOTELEPHONE USES

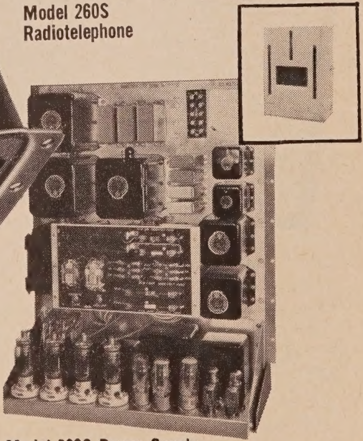
CHICAGO the World's Toughest Transformers

Applied Electronics Company, Inc., of San Francisco, builds the APELCO 260S Radiotelephone for point-to-point communication in oil exploration. This dependable equipment is the last word in rugged construction, designed to operate without failure in climatic extremes ranging from 35°F. below zero to the high temperatures and heavy humidity of tropical climates. For intermittent duty, the equipment must operate effectively from 80 volts to 140 volts input at 50-70 cycles.



Model 260S Radiotelephone

Because the rugged performance of APELCO Radiotelephone equipment is strongly dependent upon the quality of the components used, Applied Electronics specifies and uses CHICAGO Sealed-in-Steel Transformers throughout. Wherever optimum dependability and rugged performance are requirements, you'll find CHICAGO—the world's toughest transformers.



Model 260S Power Supply

Free "New Equipment" Catalog

You'll want the full details on CHICAGO'S *New Equipment Line*, covering the complete range of "Sealed-in-Steel" transformers for every modern circuit requirement. Write for your Free copy of Catalog CT-153 today, or get it from your electronic parts distributor.

CHICAGO TRANSFORMER
DIVISION OF ESSEX WIRE CORPORATION
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CABLE ADDRESS:
HARSHEEL

YOU CAN'T REPLACE EIMAC QUALITY
Eimac
(RMA 4D21)
4-125A
MADE IN U.S.A.

TYPICAL OPERATION
(Frequencies below 120 mc.)
Radio Frequency Power Amplifier and Oscillator Class C Telegraphy or FM telephony (key down conditions, one tube)

D-C Plate Voltage	2500 volts
D-C Screen Voltage	350 volts
D-C Grid Voltage	-150 volts
D-C Plate Current	200 ma.
Driving Power	3.8 watts
Plate Power Input	500 watts
Plate Dissipation	125 watts
Plate Power Output	375 watts

Quality screen-grid tubes became popular eight years ago when Eimac introduced the 4-125A radial-beam power tetrode to the electronic industry. Since that time thousands of engineers and amateur radio operators have used the Eimac 4-125A in a wide variety of applications and have consistently received outstanding, dependable performance. This versatile tetrode contains the *pyrovac** plate, controlled emission grid wire, low inductance leads, thoriated tungsten filament, and input-output shielding. All of these advanced features are found only in Eimac tubes. Add to this, high power output with low driving requirements, simple circuit design that minimizes TVI, low grid-plate capacitances, and ability to withstand heavy momentary overloads, and you have the Eimac 4-125A — quality tetrode in the 125 watt field.

Write our Amateurs' Service Bureau for a free copy of the information filled 28 page booklet, "Care and Feeding of Power Tetrodes".

**An Eimac trade name*

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San Bruno, California
Export Agents: Frazar & Hansen, 301 Clay St., San Francisco, California

Eimac TUBES

Zero Bias...

The "Mobile Handbook"

As this is being written, the "Radio Amateurs' Mobile Handbook" has been on sale for one month. The response afforded the *Handbook* has only been a little short of tremendous. Our thanks and those of the author go to the fellows who have taken a few moments to write in and say how much they enjoyed it. We hope that it provides all the information needed to keep a good mobile rig on the air.

Two questions about the *Handbook* have been asked a number of times and are worthy of repeating and answering on this page. One of them concerns the second edition (with the first one only a month old!) while the other asks "does the *Handbook* contain material reprinted from *CQ?"*

The answer to the first question is a difficult one to decide right at the moment. Undoubtedly, it will depend to a great extent on how the first volume is received and how much new equipment is developed in the forthcoming year. Should the answer to both of these questions be yes, then a second edition will probably be produced. The answer to the second question is a relatively easy—yes. The *Handbook* does contain a few completely revised and corrected topics that have appeared in *CQ*. These topics were chosen on the basis of their importance and whether or not there was any additional subject material that might augment the chapter in question. However, revised material from the pages of *CQ* is at a ratio of about 1 to 5. None of it is reprinted directly without making corrections and additions and all of it is simply used to 'round' the book out.

If you haven't seen a copy might I suggest dropping down to ask your jobber or parts distributor about it. He will probably tell you how his first order sold out within a week after it was put on the counter.

Next Month

The next issue of *CQ* looks interesting on two counts. A V.H.F. Department will appear as a result of the veritable flood of mail protesting its absence. A petition signed by V.H.F. group at the Houston National ARRL Convention also went a long way towards reactivating this department.

Much to the surprise of the readers, it will be "ghost written" and not appear under the by-line of a well-known author. However, having seen the first column I can assure you that it is interesting and somewhat different. Emphasis has been placed on new ideas, new circuitry and practical presentations of what is taking place throughout the world on V.H.F.

The second unusual event scheduled for the October issue will be the appearance of a new fictional character to relieve Scratchie. Rumor has it that Scratchi has a glass arm from so much writing to the Editor and he has asked us to only expect to hear from him every other month. Taking the place of the Scratchi letters will be short short adventures of that great radio ham and sometime detective Snorlock Ohms. Naturally, he will be seen in all of his advenures with his companion, Dr. Watts Gnu.

Our Department Editors

For the past three months your M. E. has been engaging in a rather disjointed correspondence with the editor of a club bulletin over the "editing" of one of the *CQ* departments. Just to set the matter straight for the record, our Department Editors are given complete freedom and we only ask that they do not engage or embark on a program of unjustified or non-constructive criticism. Material appearing in their columns does not represent the view of *CQ* as a separate, or political entity. As a matter of fact, *CQ* has no politics and is not the mouthpiece for any group involved in amateur affairs.

The O.O.T.C. Petition

We have purposely hesitated to say anything about the petition by the O.O.T.C. before the FCC concerning single sideband allocations. We have requested a withdrawal of the statement in the petition indicating that *CQ* took a survey of the active SSB stations and found that they represented less than 1% of the active 75-meter phone stations.

Since the O.O.T.C. does not deem it appropriate to make such an announcement, it is necessary for me to declare in print that the survey in question was not taken by *CQ*, nor by anyone connected with the *CQ* organization, and unless it can be shown otherwise the figures used in the O.O.T.C. petition have no basis in fact.

o.p.f.

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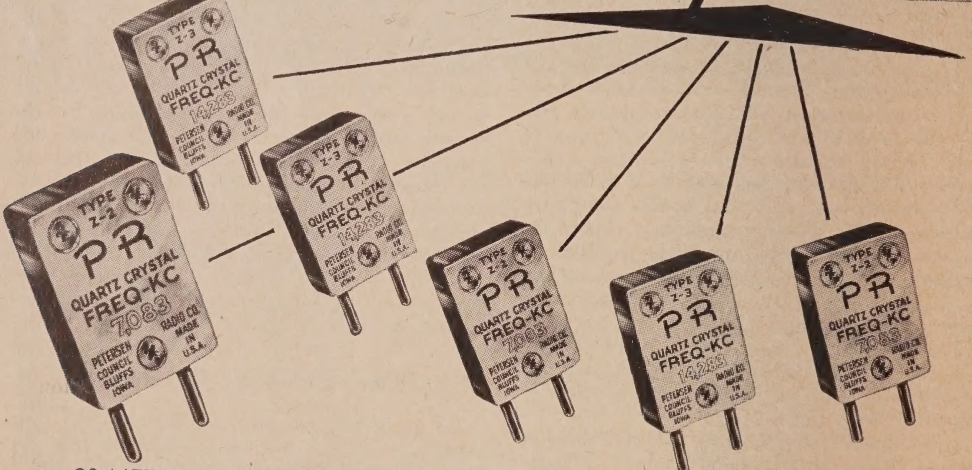
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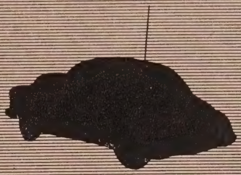
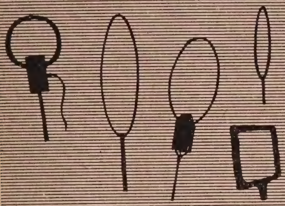
Calling all Hidden Transmitter Hunters





R. B. KUEHN, W0HKF

2003 Fremont Ave., St. Paul, Minn.

The subject of this article will interest many of our readers and should provide a background fund of information on 10 meter transmitter hunts. A second article is now contemplated describing the methods and equipment used on 2 meters. A possible third installation on 75 meter DF will be published if there is sufficient interest.—Editor.

About midway up the family tree of amateur radio there is a branch called "Mobile Operation" and part way out this branch is an offshoot known as "Hidden Transmitter Hunts," in which the hunter, armed only with a directional antenna and *S*-meter in addition to the usual mobile gear, faces the problem of tracking down the origin of a signal in *X* direction and *X* number of miles away.

It's a thrilling challenge to one's ingenuity to set out some dark night "on the instruments" in pursuit of a hidden station, and while it takes at least two persons to play the game, the maximum number that can take part has never been determined. A safe rule to follow is "the more the merrier." Unlike some of the long-haired branches of our hobby such as SSBC and RTTY, hidden transmitter hunts require only two additional pieces of equipment—a loop and an *S*-meter, both of which can be completely described on three or four printed pages.

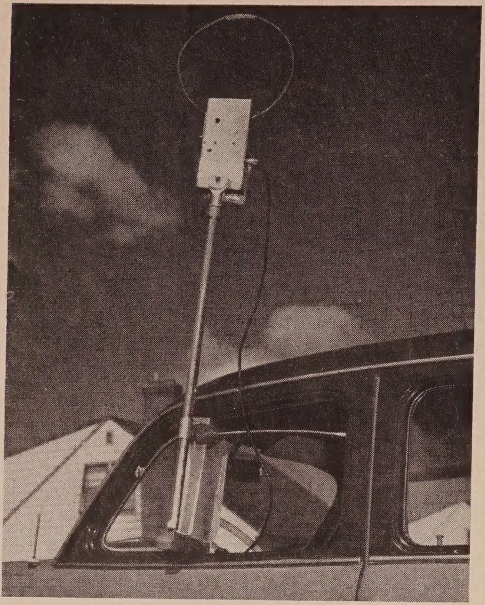
Some Cautions

Before we begin the mechanical details, however, remember to plan hunts with consideration for your own and public safety always uppermost in mind.

It is wise, and in some communities legally compulsory, to have at least two persons in each car, one to drive and the other to operate the equipment. The posted speed limit for the area you are in should never be exceeded. The hidden transmitter must use discretion in choosing a hiding place, bearing in mind that any unusual activity in certain areas after dark may be viewed with suspicion.

Here in St. Paul a year or so ago, one routine hunt nearly ended in disaster. The transmitter had been found and the cars were pulling in at a certain corner to decide where to go for hamburgers. The fellows were standing around one of the cars examining a new mobile installation when, with a screeching of tires and breaks, four squad cars appeared from as many different directions erupting police officers carrying shotguns and tommyguns and obviously in no mood for monkey business. This happened

The author, below, holding the 300-ohm ribbon, unshielded DF loop. This model was wrapped with black vinyl tape in order to weatherproof it.



This loop, built into the box from a BC610 plug-in exciter unit, utilizes the type of window-frame mounting which is described in the text. The upright piece was salvaged from an old sun-lamp.

before the days of amateur call license plates, and without ready identification we had a rather difficult time in proving our innocent intentions.

It seems we had unwittingly chosen to meet directly across the street from a brand new bank which was not yet entirely finished, but with the money moved in and ready to open for business the following morning. When the police department "plant" stationed inside the building saw our cars pull up and park across the street, he understandably got jittery and turned in a general alarm. All of which proves you can never be too careful in picking locations for a large number of cars to meet.

Construction — R.F. Amplifier Loop

Getting down to fundamentals now, there are two types of loops in general use, i.e., with and without r-f amplifiers. Both give equally good directional indications, but the former provides considerably more gain. Generally speaking, the loop with the built-in r-f amplifier will allow you to copy any signal you can hear on the quarter-wave whip, while with the other type, signals below approximately *S5* or *6* will be unusable.

Let's take the more complicated amplifier loop first. Mechanically, it consists of a metal box containing the amplifier components together with the batteries to operate it, and the loop itself, which is made of ⅜ or ½-inch copper or aluminum tubing. None of the dimensions are critical. The loop can be made 10 inches in diameter separated at the top by ¼-inch or so, and the adjoining ends of the tubing wrapped with tape to maintain the spacing.

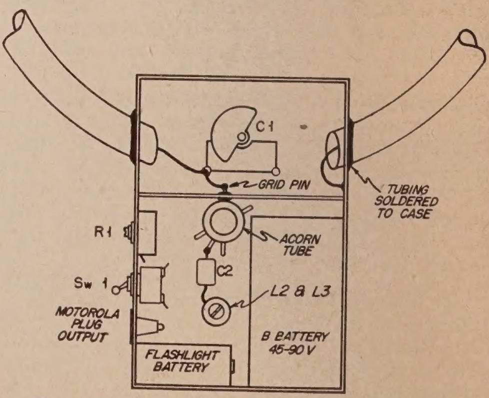
For 10-meter operation a single turn of small copper wire (#28 or #30) is pulled through the tubing. The wire should be covered with spaghetti or small glass beads for insulation and to keep stray capacity to a minimum. If the wire is too large or not kept away from the walls of the tubing, the distributed capacity may be too large to allow the loop to resonate at 10 meters.

Unless one has facilities for working aluminum, it is easiest to use a sheet metal box and copper tubing, securing the tubing to the box with heavy solder points.

Tubes best adapted to use in the amplifier are the acorn series, types 957, 958 or 959, requiring only a single dry cell for filament power. These tubes were plentiful on surplus until a short time ago and should be used if at all possible. If not obtainable, almost any small 1½-volt triode or tetrode will provide enough gain for satisfactory operation.

The circuit should be laid out in such a manner as to minimize coupling between the grid and plate components. Use of a shield is recommended between the grid tuning condenser and the rest of the circuit. If an acorn tube is used, only the grid pin need project into the grid compartment, everything else being outside the shield. The triodes, of course, will oscillate unless precautions are taken, and since neutralization never seemed to work out very well in this application, a filament rheostat can be installed and the filament voltage backed down until the tube is operating below the point of oscillation. A regenerative triode amplifier used in this manner gives just about as much gain as a tetrode. Oscillations in the loop, when present, are evidenced by strong carriers heard in the receiver, which warble when the loop is tapped lightly.

Connection to the receiver is made with a length of 52-ohm coaxial line of appropriate length (preferably of the small variety).



Pictorial diagram of typical r-f amplifier loop, illustrating placement of parts. Although aluminum may be used, copper tubing is usually preferred because of its ease of handling.

The Unshielded Loop

The second type of loop in common use, though unshielded and without r-f amplifier, nonetheless gives just as accurate indications as its bigger brothers, and fellows who use it on hunts ask for and are given no handicap or quarter.

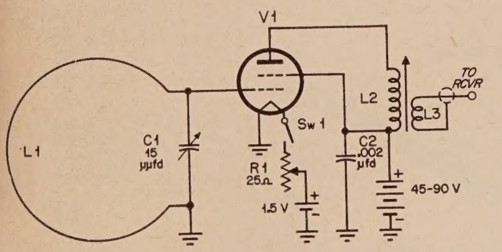
The square loop shown in one of the photographs is an example. This simple loop has brought its owner in first at many hunts and in competition with all manner of homing devices. It is constructed on a 12-inch square frame sawed from ¼ inch masonite or plywood, with a four-inch projection left on at the bottom to serve as a handle. The 300-ohm twin-lead is fastened around the edge of the frame with electrician's tape. The coil must be shielded and the shield connected to the coil center-tap, one end of the pickup coil and the outside braid of the coax.

With the loop connected to the receiver input, there should be a definite increase in noise as the device is tuned through resonance, being quite marked in the amplifier-type loop and to a lesser but still noticeable degree with the simpler model. Either loop, however, will, at its resonant frequency, give a strong indication in a grid dipper held two or three inches away.

Is Your Loop Working Properly?

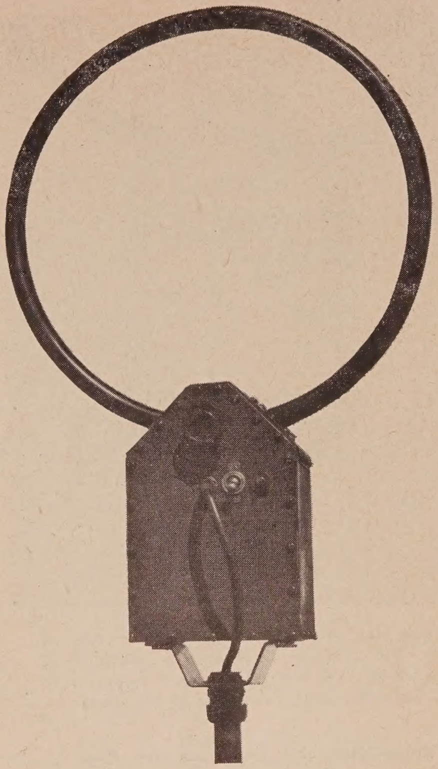
These are but two examples of successful direction-finding loops, and there are endless possible variations of design. Regardless of which type you use, there is one simple, infallible test to determine whether your loop is indicating correctly. Tune in a signal and rotate the loop until a dip in signal strength occurs. Take careful note of the loop's position, then turn it 180 degrees to the opposite direction. Another null or dip should appear exactly 180 degrees from the first. If it does, your loop is working perfectly; it not, your loop is not to be trusted. The nulls or sharp dips in signal strength occur when the plane of the loop is at right angles to the direction of arrival of the signal. An easy way to avoid confusion is to remember that when the loop is at the null point, you look directly through it at the hidden transmitter. Important factors in proper operation are equal pickup in both sides of the loop, and complete shielding to avoid r.f. pickup in any other portion of the circuit except the loop itself.

To date no *simple* way has been found to resolve the 180 degree ambiguity of the loop antenna—it gives no indication which of the two nulls is the correct one. Fortunately we have at disposal a means of quickly determining the approximate direction of arrival of a received signal. Most mobiles have their whips mounted at the rear of the car, resulting in a pronounced gain (2 or 3 *S*-units) on signals arriving from the direction in which the car is facing. The procedure is to drive the car in a circle while watching the *S*-meter. Stop when the strongest signal is being received, and the car will be headed in the approximate direction of the transmitting station.

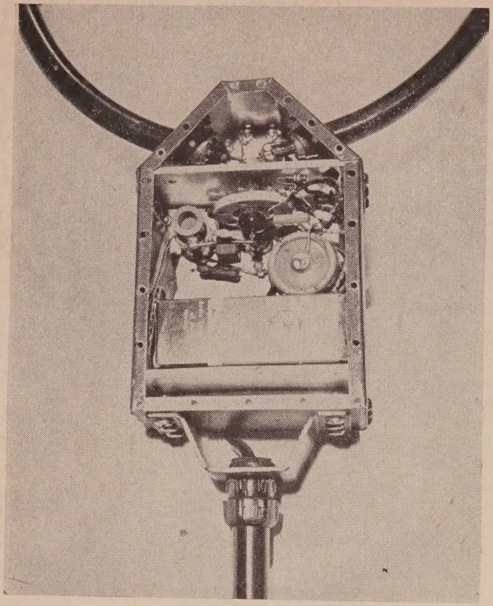


R1—25 ohm rheostat
C1—15 µµfd. air trimmer
C2—.002 µfd.
L1—single turn #28 (see text)
L2—15 turns #18E closewound on ½" slug-tuned form (National XR50)
L3—3 turns hookup wire wound on L2
Sw1—s.p.s.t. toggle switch
V1—1.5v triode or tetrode (see text)
Note—if triode is used, omit screen to B+ lead, but retain C2 in circuit.

Parts list and schematic of loop and amplifier. Tube V1 can be almost any small 1½-volt triode or tetrode. R1 provides filament voltage control in order to prevent oscillation.



An exterior view of the r-f amplifier loop. The s.p.s.t. switch is in series with the loop filament, and may be turned off when in close proximity with the hidden transmitter.



Interior view of the built-in r-f amplifier type of loop. This particular loop used a length of 72 ohm co-ax with the outer shield removed to form the inner conductor at the loop.

Attaching the Loop to the Car

Opinion seems to be about equally divided as to whether it is best to hold the loop in your hand when taking bearings or to fasten it to a window-mount as shown in the photographs. If you decide to use a mount for your loop, you probably have your own ideas on how to build it. One method of construction is suggested in the photograph. Exact dimensions and details will have to be tailored to fit your particular car window. The loop is fastened to a two- or three-foot length of aluminum tubing or a broomstick. The main support member may be fashioned from a piece of two-by-four lumber, grooved on each end to conform to the curve of the window, with sponge rubber or felt glued to the ends to protect the car finish. The completed mount is then wedged in the car window opening against the upright partition dividing the main window from the wing. It is held in place by a stiff rod from the center of the two by four to the window guide groove at the opposite side.

The S—Meter

S-meters are a necessity in serious direction-finding work, and they run the gamut from a simple milliammeter lying in the glove compartment to de-luxe illuminated jobs permanently fitted into the dashboard ashtray openings.

The simplest satisfactory *S*-meter is a low range milliammeter of about 4 or 5 ma. full scale connected in the receiver between cathode and ground of one or more r-f or i-f stages. A meter connected in this manner will read 'backwards'; that is, with no signal it will read nearly full scale, swinging back toward zero when a signal is tuned in. A forward-reading *S*-meter requires a simple bridge circuit. Either type works well for this application, and full details can be found in any handbook and need not be repeated here. Signal-strength meters are almost universally used in home stations and are being found in more and more mobiles where they are proving to be equally useful. There! So much for the work—not as bad as you thought, eh?

Now for the Hunt

We're meeting tonight a the fairgrounds where there's plenty of room for all the cars to circle without danger of bumping into each other. Whoever happens to arrive first at the meeting place makes a note of each mobile as it comes in, the frequencies of any who are not on the net frequency, and eventually gives the list to the hidden transmitter when it comes on the air at 8 o'clock.

Okay, we're all here—the loops are on the cars, tuned up—we're ready to go, and it's every man for himself!

With our rear-mounted whip connected to the receiver, we pull some distance away from the rest of the gang and make a couple of slow circles, keeping an eye on the *S*-meter. We get an *S3* reading when headed south and *S5* when facing north, so we pull out of the south entrance of the grounds (to confuse the others) and head north on the nearest through street.

With our whip tied down and running on the loop, the hidden transmitter's signal is weaker, fading out completely on the null, which now indicates due northeast, being a more accurate check than we got from the broad maximum off the front of the car with the whip.

(Continued on page 67)

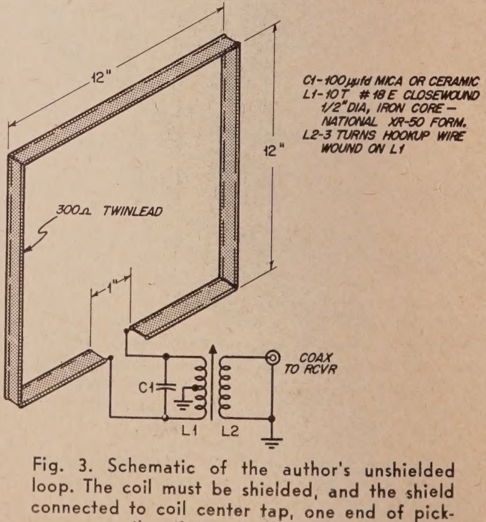


Fig. 3. Schematic of the author's unshielded loop. The coil must be shielded, and the shield connected to coil center tap, one end of pick-up coil and outside braid of co-ax.

The Not-So-Silent SWL

C. TIERNEY

The SWL who lives around the corner came over to see my transmitter the other day. He was short and thin and had a fuzzy beard. He couldn't have been more than sixteen, and had a slow, gentle manner of speaking. Obviously, he was an innocuous sort of fellow who wouldn't harm a fly.

"I built a three tube regenerative receiver," he told me proudly, "and I listen to you on the air all the time. I feel I know you like a brother. You've been married three times and have false teeth. They used to call you Bobo in college because you were so dumb. And I agree with you that your first wife didn't have grounds for divorce just because your transmitter hummed and kept her awake all night."

". . . I've got a little black book full of interesting facts . . ."

"How do you know all this?" I asked the strange boy, white faced with shock.

"I told you I listen to you all the time. I got a little black book full of these interesting facts. I make notes of all the conversations I hear. Like I got down how you are susceptible to boils on the neck and never wear pajamas in bed."

"Why have you got all this written in a book?" I asked, suspicious of blackmail.

He shrugged. "It's sort of like a Hollywood fan magazine. Amateurs are like movie personalities to me, and I like to learn all that I can about them."

And then I had a ghastly thought. How many hundreds or thousands were there like this boy—silent SWLs, willing to fight the QRM to hear newsy tidbits about unsuspecting hams. And where else but on the ham bands can anyone hear such a multitude of people, their tongues loosened by warm congenial brothers, unburdening themselves of their woes and foibles.

When I took him into the shack, he said, "Try twenty meters. The band is open. I have a friend who has a big receiver and we were listening this afternoon."

I tuned through the band, and Jacque, an F was coming through S9. I gave him a call.

Now, Jacque has more YLs than a 1909 transmitter had harmonics, and he used the same strategy on each new girl—his transmitter was a lure. He'd get them into his schack, and then, to show how rare a fellow he is, he'll work the United States. This is step number one. Number two is to let the girl talk to the U. S. herself, translating if she doesn't know English. Talking across the Atlantic usually melts the most adamant damsel to Jacque's electronic charms.

" 'Allo, 'allo," the Frenchman said impressively. "I 'ave a girl here who speeks English and she would wish to speek with America." We could hear the YL chattering in the background.

When I came back to him, I handed the mike to the SWL. I have never done anything as wrong in my life!

"I listen to you all the time, Jacque," the SWL said. "I think I recognize the girl's voice. Wasn't she there last week? It's Maria. . . .No—wait a minute! Maria can't speak English. She was there two weeks ago, I think. Let's see now. . . ." The SWL scratched his head. "Jeanette was there before Jacqueline—or was that Lorraine? No. That must have been Suzette. Then could this be Yvonne? Wait! Yvonne has a deeper voice, something like Marlene's. I've got all your girls' names written down at home. Wish I'd brought

MEL LAZARUS

". . . it's Maria—no, Jacqueline, or was it Jeanette—Suzette? Yvonne?"

(Continued on page 46)

Amateur Teletype

As Reported by
WAYNE GREEN, W2NSD

1379 East 15th St.,
Brooklyn 30, N. Y.

The QRM hassle should be a good subject to glib over and raise some of the more precarious blood pressures into the danger area. CW men, take your heart pills and read on. If it weren't for the fact that most of the teletypers are CW men I would have a better chance to stoke the phone CW flames from the phone side of the furnace. Oh well, guess I'll stick to the middle ground and pump some RTTY propaganda. The pump has already been well primed by one or two emotion-torn publications which have been wringing tears from their readers over the total loss of the CW bands which RTTY is "sure to bring." Their suggestions of euthanasia as a remedy for the virulence of the radioteletype bug are characterized by plans for moving all of the TT stations into the phone bands, the Novice bands, the broadcast bands, the 12,000 Mc. region, etc. Judging from the fanaticism involved, the introduction of RTTY into the low frequency bands is as dangerous to CW as SSB is supposed to be to phone.

Even the most chronic complainer usually has some shred of fact upon which to build his long story of doom. In this case it must be admitted that there have been some few instances of QRM being caused to CW stations. Investigations of these instances have turned up the fact that a great many of the amateurs, particularly some of the more overwrought individuals, don't know a radioteletype signal when they hear it. The bulk of the complaints have been due to commercial and military stations, not amateurs. This is absurd when you consider that an amateur TT station is easily identified as such for he sends his call at the beginning and end of each transmission, using CW. If the station you are cursing does not sign on CW it probably is a commercial station which is mistuned, or an image. Even FCC monitoring stations have been known to become confused between make/break signals and FSK signals. And just a few months ago a Navy station set up on about 3615 kc. and ran test tapes for several days.

At a meeting of the Twin Cities RTTY Club the following attended on July 8th: (Rear) W0HZR, ex-W6WCD, W0PEV, Ed Johnson and W0HFU. (Front) W0VER, W0UDJ, W0WUF, W0KKP and W9TCJ.

Two demerits to any RTTY'er who doesn't sign his call on CW. One demerit to those that send hand FSK call signs instead of make/break; people like me who have so many parasites in their rig that they can't lift the key without every television set in the block blanking out. Five demerits and you win a gold tasseled box of poisoned chocolates such as we send to editors of emotion-torn anti-RTTY publications.

One other too-bad complaint has been huffed and puffed into a big thing. This is the startling news that CW men cannot copy RTTY. This is unfortunate, but can easily be fixed by the simple addition of a printer to the shack equipment. Actually, this argument against RTTY seems pretty silly to me because I have been faced with the same problem with CW. Somehow, many years ago, I managed to copy enough code at 13 w.p.m. to get my license. Since then my code speed has been slowing down at the rate of about 3 w.p.m. per year. The result is that when some one calls me on CW it takes quite a while before I even know that it is me they are calling. I installed a hand-key in the rig at the insistence of the FCC and have brushed up on my call letters enough so that I can generally get them across with one or two tries. Every now and then a CW station calls me on the RTTY channel sending about 20 to 90 w.p.m. My stumbling requests for them to slow down usually result in a ten minute transmission of CW at 15 w.p.m., of which I sometimes can make out part of the call letters of the station that is sending. What they have said I'll never know. Now, I'll tell you what. If all of the CW stations will put in printers, I will brush up on my code. That's fair enough isn't it? CW is no more readable to me than RTTY is to you. We're even, eh?

Bulletin

The response to the short writeup about the ARTS Bulletin in the last column caught me off balance since I didn't expect much ado during the summer months. At any rate, please excuse the delays in receiving your sample bulletins.

Another Ace

Ah, yes. I seldom go plunging into a full fledged controversy without a couple of extra aces up my sleeve. Among the gallery of raised voices (against RTTY), the most pious are those that point out that our bands are already filled to bulging and that there just isn't room for addition of RTTY FSK signals. True, during certain times of the day at certain times of the year, the bands are pretty well crowded. This sort of excuse held the top end of 40 for the CW men until someone thought of listening down there and found that it was almost empty. With more and more selective receivers the

(Continued on page 48)

Getting Started on Single Sideband

J. N. BROWN, W3SHY, ex-W4OLL

16 Crest Ave., RFD 3, Bristol, Penna.

This sixth section of the SSB series describes the 1-kw linear amplifier in use at the author's station. The simple design procedure used is outlined so that it may be applied to other tubes to be used in linear r-f service—Editor.

Part VI

For those who want to go "whole hog" and try a full kilowatt of single sideband: Read on to the bloody end of this SSB saga. Those who take no joy in hearing the household watt-hour meter echo the resounding CQ's in falsetto can turn to the latest article on transistors.

Seriously, however, I would like to describe some aspects of designing the higher-powered linear amplifiers and also the practical slant on the subject. As it always turns out, the manufacturers never seem to build just the exact coil or condenser you dream up on the design pad. Obviously, they cannot predict all the desired values, so the amateur must make intelligent substitutions in order to preserve the original design ideals.

The amplifier to be described uses the well-known *Eimac 304TL* that gathers dust in so many Hams' attics since being purchased surplus for seventy-nine cents each. The 304TL is a low-mu triode that falls into the more desirable class of linear amplifier tubes mentioned in *Parts IV* and *V* of this series. To review briefly: The low-mu tubes require high d-c grid biases and accordingly high grid signal voltage swings to economically utilize them. However, if the positive grid operating region is avoided, no grid driving power is required and at the same time a respectable output is obtained. Also if no grid current is drawn the foremost cause of distortion products is avoided—poor grid signal voltage regulation (see *Part IV*).

TABLE 1

CLASS B AUDIO AMPLIFIER OPERATION--2 TUBES, TYPICAL OPERATION

DC PLATE VOLTAGE	1500V	2000V	3000V
DC GRID VOLTAGE	−105V	−160V	−260V
PEAK AF GRID TO GRID VOLTAGE	500V	580V	650V
ZERO SIGNAL DC PLATE CURRENT	270Ma	200Ma	130Ma
MAX. SIG. DC PLATE CURRENT	1140Ma	1000Ma	667Ma
MAX. SIG. DRIVING POWER (APPROX)	30 W	25 W	6 W
EFFECTIVE LOAD, PLATE TO PLATE	2750Ω	4500Ω	10200Ω
MAX. SIG. PLATE POWER OUTPUT	1100W	1400W	1400W

Table 1. An extract from the Eimac characteristic sheet. For specifications on single tube operation, see text.

I propose to take the design of this stage slowly and attempt to explain as simply as possible the apparent hokus-pokus that some people toss about glibly.

We must make up our minds before we start just what we want to end up with. Do we want to drive the stage into full Class B operation by going into the positive grid-current region? Or should we avoid grid current like a case of measles? If we choose to stay out of the grid current region, our grid tank circuit can assume almost any proportions *L* and *C* wise, but once we have done this we must be darned sure never to draw grid current or we will really be in hot water because the grid-voltage regulation will be poor. On the other hand if we resign ourselves to operation in the grid current region for at least a portion of the excitation-voltage swing, and design our tank accordingly, we can operate in the no-grid-current region with a clear conscience. In the event of an occasional pulse of grid current the grid-signal voltage will hold up. My advice? Do the latter—design the tank for grid current operation and feel safe. There is a price that we have to pay for this peace of mind. In order to stabilize the grid signal voltage under load changes, we must swamp the grid tank circuit with a resistor which consumes a fair amount of power whether we are in the grid-current region or not. On with the show! Let's see what happens in Act II.

Plate Tank Circuit Design

For academic reasons let's list the pertinent information on the 304TL as listed in the *Eimac* characteristic sheet. (See *Table 1*)

You will notice that this table is for two-tube operation. The amplifier in question uses only one tube so appropriate changes must be made before we dive into serious design. The author's high-voltage supply is capable of 3000 volts with good regulation, so the design was worked out with 3000 volts d.c. in mind. Another point is that the driving-power requirements drop sharply when the operating plate supply voltage is increased to 3000 volts. Going down the above table in order of listing the circuit conditions for single-tube operation should be: Plate voltage—3000 volts, d-c grid bias—negative 260 volts, Peak grid-to-grid signal voltage—325 volts (just half of that listed), Zero signal plate current—65 ma. (Also half), Maximum signal d-c plate current—333 ma. Maximum signal driving power—3 watts (half), Effective plate-to-plate load—2550 ohms (one quarter of that listed in the table, more later), and Maximum power output—700 watts.

All of the above changes for single-tube operation are at first glance obvious except the plate-to-plate impedance for the single-tube case. Why should a single tube have one quarter the plate load impedance of two identical tubes in push-pull? Since in class B operation the tube conducts only over approximately half of the grid excitation cycle, each tube in the push-pull case feeds one-half of the center-tapped plate tank coil for one-half of the time. This means when one tube is idle its half of the tank coil is not receiving a d-c pulse of current. So each tube effectively works into one half of the coil. Since in any transformer (the tank coil and link coil form a step-down transformer) the impedance of a winding is proportional to the square of the turns ratio, the total coil (primary winding) will have four times the impedance of half of the coil—or to state it the other way around: Each tube works into an impedance equal to one quarter of that of the total coil. So whether our tube is in a push-pull circuit or in a single-tube circuit it must look into a 2550-ohm load impedance. So there! One more comment, if the stage is operating class A or in class AB1 where the plate current swing might be small, the above described procedure is not to be used. In the class A case, each tube conducts over the entire grid excitation cycle and there is no time when either tube is cut off. Thus each tube must look into a load impedance that is *one half* of that of the total winding. We need not be concerned with this exception to our rule here.

Now for some pencil pushing. There will be some things that you will just have to take my word for, and there will be others that I will attempt to explain in my best foggy style.

We will assume a loaded plate tank circuit Q of 15. This Q thing is the ratio of the load impedance to the reactance of either the tank condenser or tank coil since the two reactances are equal at resonance. In formula form:

$$Q = \frac{R_L}{X}$$

where we know Q and R_L (equal 2550 ohms). The thing we want to know is the reactance X so rearranging things we get

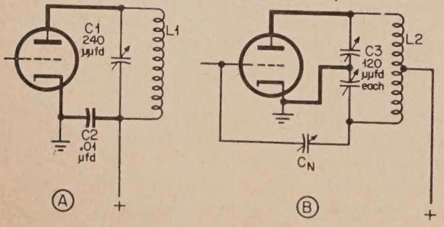
$$X = \frac{R_L}{Q}$$

If we stick numbers in our formula:

$$X = \frac{2250 \text{ ohms}}{15} = 170 \text{ ohms}$$

So for a Q of 15 our tank condenser and coil must have reactances equal to 170 ohms *no matter what band we are operating on.*

Fig. 1. The changes necessary to convert the designed "single-ended" tank circuit in (A) to the normal "double-ended" arrangement in (B). Tube load resistance is the same in both cases. Parts list is for 4.0 Mc. operation.



C1—240 μμfd. (in use) "single section" condenser
C2—0.01 μfd. bypass condenser
C3—120 μμfd. (in use) per section "split-stator" condenser
CN—neutralizing condenser
L1—6.5 mh.
L2—26 mh.

Some one will ask, "Why use a Q of 15?" It is like this: If we increase the loaded tank Q we will decrease the stage efficiency so that the tube plate dissipation becomes greater for a given output power. However, if we decrease the loaded Q the stage efficiency will go up toward the theoretical limit of 78%, but the selective properties of the tank circuit will deteriorate so harmonics of the fundamental signal will not be suppressed and the output wave shape will get poorer. From experience it has been found that a loaded Q of 12 to 15 is satisfactory. If you must vary from these limits, my advice is to err toward higher values of loaded Q even at the expense of a few watts output.

Next in our figuring is to get some condenser sizes: Effective tank capacity

$$C = \frac{1}{6.28 \times F \times X}$$

where F is the frequency in megacycles, X is the 170 ohms reactance, and the capacity C comes out in microfarads. Again plugging in numbers: (For 3.9 Mc. operation)

$$C = \frac{1}{6.28 \times 3.9 \times 170}$$

= 0.000240 μfd. or 240 μμfd. Remember this is the effective tank capacity for single-ended tank operation. This value must be converted to the values used with a center-tapped coil normally used in plate neutralization. Now refer to *Fig. 1,* part *A* of which shows the effective tank capacity that we have just calculated. You will notice that no provisions for plate neutralization have been made. If grid neutralization is used, this value of 240 μμfd. capacity is the one to use across the total coil with B+ applied to the one end of the coil. This is a whopper of a condenser even for a single section job. Now look at *Fig. 1* (*B*) and see what happens when plate neutralization is used and the plate is effectively tapped down on the coil so that the tube works into one-half of the coil. The

TABLE 2

AMPLIFIER PLATE TANK CIRCUIT

AMATEUR BAND	EFFECTIVE TANK CAPACITY (PER SECTION)	RECOMMENDED B & W COIL
80	120 μμfd & PADDERS (SEE TEXT)	40 TVH
40	65 μμfd	40 TVH
20	33 μμfd	20 TVH

Table 2. Amplifier plate tank specifications. Althought the 40TVH is rated at 500w AM or CW, it will handle a kw. of single-sideband power.

tube must still operate into its proper load impedance so if the tube is tapped half-way down on the coil the tubes sees only one quarter of the total tank impedance, and some changes must be made. The thing to do is to multiply the tank impedance by four times so that the tube once more looks into its proper load—2550 ohms. In order to raise the tank impedance by four times the reactance of both the coil and condenser used must be raised four times. This makes the coil four times larger in inductance, and the effective tank capacity one quarter of its former calculated value. Thus the effective capacity becomes 60 μμfd. across the coil, but since we are now using a split-stator condenser the capacity *per section* is 120 μμfd.

I hope that you haven't become lost in the details so far. We must now choose our tank coil. From our known value of effective tank capacity (60 μμfd.) and the frequency we can calculate the size of our coil. The formula to use is:

$$L = \frac{1}{39.5 \times F^2 \times C}$$

where *L* is in microhenries, *F* is in megacycles and *C* is in microfarads. For our 80-meter band case where *C* is 60 μμfd, the inductance comes out to be approximately 26 microhenries. Consulting the catalog the *B&W* Ham-band coils run as follows: The *80TVH* coil has an inductance of approximately 43 microhenries and the *40TVH* coil has approximately 20 microhenries inductance. Our value of 26 uh. falls nearer to the 20 uh. value than the other, so we choose the *B&W 40TVH* tank coil. This compromise in choice will raise the loaded tank circuit *Q* slightly, but not enough to concern ourselves about.

I'm sure that someone is going to bring up the fact that the *40TVH* coil is only rated at 500 watts. Very true, indeed. Don't forget this rating is for *AM* or *CW* transmitter use where the continuous power input might be one kilowatt. In our single sideband case, however, our power input is one kilowatt on peaks of the speech input and the average power (the thing that burns up components) is considerably less—usually well below one-half kilowatt. If you do make it a practice to operate CW or insert carrier with this amplifier, remember to keep the maximum continuous input power below one-half kilowatt just so the coil does not melt down. If additional ventilation is provided, this one-half kilowatt limit can be increased somewhat.

How about the coils and condenser settings for the 40-meter and 20-meter bands? Running through the same calculations that we did for eighty meters except substituting the 7.2 Mc. where we had 3.9 Mc. previously, we come up with the following: Split-stator tank condenser setting—65 μμfd. per section, Coil inductance required 15 microhenries. Again we are stuck with a compromise—the value desired is closer to the 20 uh. of the *40TVH* coil than the approximately 6 uh. of the *20TVH* coil, so again we can use the *40TVH* coil for 40-meter operation. Hoot-Mon! That's what I call good design! Actually, this will lower our loaded *Q* to the lower limit of approximately 12—which is still a safe value. The 20-meter band parameters come out as follows: Per section tank capacity—33 μμfd. Coil inductance required—7.6 uh. The *20TVH* coil has an inductance of 6 uh., so that is the one to use. Again our loaded *Q* is just a little *above* what we decided upon, but within reason. *Table II* gives these figures in a little more available form.

Grid Tank Circuit Design

Now that we have the plate tank circuit out of the way we can concentrate on the grid tank circuit. The author's particular line-up used an 829B in the output of the exciter to drive the final. The 829B had 500 volts plate supply voltage and is capable of delivering about 100 watts peak power output. This is obviously a lot more than necessary to drive the 304TL amplifier under even the worst of conditions. The philosophy of generating more driving power than is actually required is one that I recommend all SSB neophytes follow. This philosophy is not only good in SSB work but in CW and AM as well, but the fruits are more apparent on the distant receiving end in the case of SSB. Cleaner, distortion-free signals will be the result.

Consulting our extracted tube-sheet characteristics again, we see that there are three items that concern our grid circuit: the d-c grid bias, peak grid voltage, and grid driving power. For the chosen plate voltage, the grid bias is -260 volts. This can be furnished from any negative supply with 255 volts of voltage-regulator tubes hung across its output. This is what was done in the transmitter described and is a rock-solid supply. The author finds that the 304TL tubes vary considerably from tube to tube and on some tubes it is necessary to use 300 volts of negative bias to

TABLE 3

AMPLIFIER GRID TANK CIRCUIT

AMATEUR BAND	EFFECTIVE TANK CAPACITY	RECOMMENDED B & W COIL
80	157 μμfd	40 MEL
40	85 μμfd	20 MEL
20	43 μμfd	10 MEL

Table 3. Grid tank circuit specifications. A 225 or 250-μμfd. condenser would seem adequate for this circuit.

keep the idling-dissipation within reasonable limits. Don't be disturbed by this; just plug in another type of VR-tube and forget it.

To get to the actual tuned circuit we proceed along the same general lines that we did in the design of the plate tank circuit.

We first must find what resistance is represented by the grid when it takes driving power and swings into the grid-current region of operation. The equivalent grid resistance is

$$R_{(eq)} = \frac{E_g^2}{2 \times P_g}$$

where E_g is the peak grid voltage (325 volts) and P_g is the grid driving power required (3 watts). Substituting numbers in our little formula we find that $R_{(eq)}$ is equal to 17,600 ohms. This is the equivalent grid driving resistance for the circuit conditions set up. Unfortunately, this does not remain constant during the complete driving voltage cycles because there is a fair share of the time when the tube is drawing no grid current at all. When no grid current is drawn the tube grid looks like a resistor with almost infinite resistance. As soon as grid current is drawn this infinite resistor lowers its value to as low as the calculated 17,600 ohms. This is quite a large relative change. In order to bring this resistance excursion more within reasonable limits, we must lower the no-grid current resistance by placing a grid swamping resistor across the grid tank coil. The exact amount to put across the coil is a matter of debate among many of the SSB brethren. Being on the ultra-conservative side, I take the attitude that the resistor should be lowered in value until you notice a shortage of driving power. With plenty of driving power available in the first place this usually ends up by being quite a low value. In the case of this amplifier, a value of 5000 ohms was chosen. Let us look again at what happens when the tube swings into the grid-current region. The grid resistance for no grid current is 5000 ohms and for the maximum grid-current condition is 17,600 ohms in parallel with 5000 ohms or 3900 ohms. This means that our grid resistance swings from 5000 down to 3900 ohms for the extreme condition encountered. This is considerably better than swinging from near infinity down to 17,600 ohms.

We must now design our tuned circuit around this 3900 ohm value of grid resistance. We again choose a grid circuit Q of 15 (values as high as 20 or 25 are not out of line for grid tanks). As before the reactance of the grid tank components for all frequencies is calculated by dividing the resistance by the Q. This comes out to be equal to 260 ohms. Just as we did for the plate tank circuit we calculate the sizes of the grid tank condenser by plugging the numbers we already know into the formula:

$$C = \frac{1}{6.28 \times F \times X}$$

(Continued on page 54)

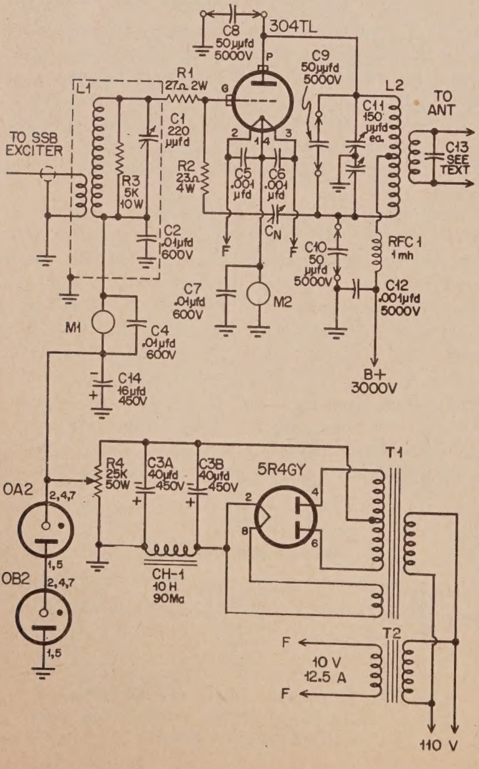
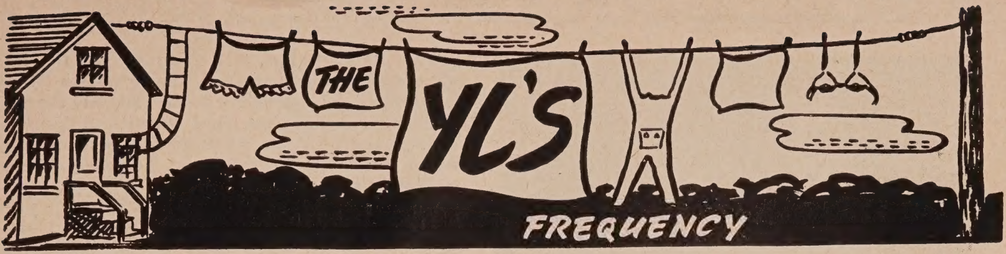


Fig. 2. Complete schematic of 1-kw linear amplifier and bias supply.

R1—27 ohms, 2w, carbon
R2—23 ohms, 4w (2 parallel 47-ohm 2w carbon)
R3—5000 ohm, 10w non-inductive
R4—25,000 ohm, 50w, with slider

C1—220 μμfd. single section air variable
C2, C4, C7—0.01 μfd., 600v disc ceramic
C3a, C3b—dual 40 μfd., 450v electroy (can be insulated from chassis)
C5, C6—0.001 μfd., 600v mica
C8, C9, C10—50 μμfd., 5000v vacuum padder (used only on 80 meters)
C11—150 μμfd. per section split-stator transmitting air variable
C12—0.001 μfd., 5000v mica
C13—600v mica; for 80 meters—1200—300 μμfd.; for 20 meters—75 μμfd.
C14—16 μfd., 450v electrolytic
CN—neutralizing condenser, 12 μμfd. maximum capacity
RFC1—1.0 mh., 500 ma. r-f choke
CH1—10h., 90 ma. filter choke
M1—0-15 milliammeter
M2—0-500 milliammeter
T1—350-0-350v at 90 ma., 5.0v at 3 amp.
L1—see Table III
L2—see Table II



THE YL's FREQUENCY

Monitored by LOUISA B. SANDO, W5RZJ

959-C 24th St., Los Alamos, New Mexico

As we write this the National *ARRL* Convention at Houston, Tex., July 10-12, has just become a memory for those who attended. No time for many details yet, but apparently there was a good turnout of YL's and they had many organized activities for the XYL's and YL's including a boat trip, tea and breakfast. At least a few New Mexico YL's attended including W5DRA, Teev; PKL, Billie, and WN5YBJ, Marion. SCM W5ZU had suggested that the New Mexico YL's and XYL's wear squaw dresses and we hear they looked very nice. W5DQF, Madie Eidson, of Temple, Tex., won the prize as holder of the oldest YL license—20 years!

Nylons

The YL's of Washington State have recently formed a new net and call themselves the NYLONs (Northwest YL Operators Net). Those checking in to date include W7's COX, GXI, JFB, PTX, PTY, QYN, RHM, RSA, SFR and SFS, with W7QYN, Lois at Sunnyside, doing an FB job as NCS and W7JFB, Miriam at Mukilteo, a very able alternate. JFB also acts as an official bulletin station for the net. The net meets at 8:30 PST every Wednesday morning on 3820 kc. After the YL's check in and have a couple of rounds, the OM's are invited in for traffic handling, signal reports and general comments. Any YL's (and OM's) who can hear the net are invited to join in.

New Mexico State Picnic

Sorry to be late with this—the get-together was May 24th—but there just wasn't space enough in the last issue. Thirteen YL's met at the New Mexico picnic which was held at the Bottomless Lakes State Park near Roswell. A pretty spot, but there was too much Hamming and rag-chewing for us to pay much attention to the lakes or the park. W5ZER, Isabel, was handling registration, with the help of W5TDB, Emma; Both gals are Roswell Hams. At the time of the picnic Isabel, whose OM is RWH, had held her license for just one month. Shortly after the picnic they took off for a vacation trip to Yellowstone National Park. Emma, whose OM is PGJ, has been on the air for a couple of years. She has earned her Class A and operates all bands, but her work as a nurse takes up most of her time.

Many of the girls who attended are members of the New Mexico YL MARS: A5RTS, Cleta; DRA, Teev; RFK, Deloris; TYX, Lizette; ZA, Eunice; YAS, Blanche; ZEV, Irma, and TDB, Emma. Lizette, TYX, came all the way from Lubbock, Tex., for the gathering. In addition to checking into the N.M. YL MARS net for the last year, she is active in the Oklahoma-Texas traffic net meeting on 3960 kc. seven days a week. Licensed in Dec. '51, she had also earned her Class A.

Cleta, RTS, and her OM, MOX, own and operate a drug store in Roy, in northern New Mexico. Cleta has been on the air since 1950. She is an avid CW operator and when she isn't helping her OM, running her home or on the MARS nets, you can find her on 40 CW using an ARC-5.

Teev, DRA, of State College, needs no introduction to these pages (see *CQ*, May, '51). Teev and her OM, BIW, are now editing and publishing *CQ NM*, the New Mexico state bulletin, and Teev is working full time, too, so figure out when she gets time for Hamming! They did find time, though, to get to the National Convention at Houston. Deloris, RFK, is from Alamogordo, where her OM, RFJ, is with the Air Force at Holloman Air Base. They have an airport-filling station which they use for their other hobby—flying—and they own their own plane.

Lillie, RQK, and her OM, RFF, are at Albuquerque where he works at Sandia Base. At the May meeting of the Sandia Base Radio Club, Lil was elected secretary—the very first YL to become an

W5ZA, Eunice Falconi, YL of the month.

W3UUG, Miriam Blackburn, of Ingomar, Pa., newly elected secretary-treasurer of YLRL. Last year Miriam served as editor of YL Harmonics. The XYL of W3MPO, she has four jr. ops. On the air since 1939, her operating time is spent on 75, 20 and 10 where she is active in the YLRL nets. Miriam is proud possessor of the W1MCW gold cup as third straight winner in the phone section of the YLRL Anniversary Party.

officer of this club. (The OMs all have to break down sooner or later, don't they—hi!) Most of Lil's activity is on 2 meters.

Irma, ZEV, and Blanche, YAS, are both from Carlsbad. At the time of the picnic Irma had been on the air just a month. With no landline at home she had put her ticket to use mostly by having an 11:45 a.m. daily sked with her OM on mobile to see if he was coming home for lunch! Blanche had her first class commercial long before she had her Ham ticket. She and her OM, LLG, are engineers for BC station KAVE and live at the transmitter site. Blanche says as far as she knows they are one of only two such husband-and-wife BC engineer couples. Any other bidders? She also said her OM told her she couldn't get a Ham ticket—so she did!

Gen, W6EHA, had just received her Ham ticket when we first met her at the Southwestern Division Convention in Los Angeles in '48. She has done a lot of operating since then, most recently from a trailer at Las Cruces (N.M.) while her OM was working at White Sands Proving Grounds. Now they are back in Santa Monica again.

We were happy to meet Opal, UXW, at the picnic. Opal is from Wink, Tex., and we'd worked her on 40 phone not too long before. She's a little bit of a gal—and on the air sounds just that. Seems she lost her voice in 1917 and it's never been quite the same since. Actually, she's a white-haired grandma with 4 grandsons and 6 granddaughters! When 10 meters is open she operates with her own 140-watt rig (she was up to 43 States on 10). When it isn't she uses her OM's (MZK) 700-watt rig on any of the other bands.

Last but not least we come to Eunice, W5ZA. But hers is an entire story by itself.

YL of the Month—W5ZA

The evening before the picnic we were guests of W5ZA, Eunice Falconi, at her home in Roswell. A delightful occasion, indeed—looking over old museum pieces from her OM's earliest days in radio, mulling over all the "old times" and present, and we even turned on her kw. rig, but rag-chewing won out.

Eunice, herself, has held a license since 1938, but her OM, Louis, has been a Ham from 1911, his first call 3UA in 1912. He came to New Mexico for his health and there met Eunice. It wasn't until 1934 that she became actively interested in Hamming. That year they attended the National Convention in Chicago where they met many Hams and their XYL's. Later, when they returned to Roswell and Louis was in QSO with these Hams, they always asked for her. Finally she came to the mike; they told her what an FB voice she had so she kept on talking, and then started studying for her license. She got her Class C in 1938 and a year later both Class B and A. These were operator licenses only and they always operated under Louis' call, W5ZA. Then Louis joined the Silent Keys on Jan. 1, 1948. Eunice (after having received W5OMI) requested FCC to give her the call W5ZA—after all, it was the station that was licensed 5ZA and she would be using the same station. This was contrary to FCC policy, but finally they granted her the call—a tribute to Louis and to her. It was in 1948 that she became W5ZA.

It's a beautiful station—a full kw. rig that Louis

(Continued on page 60)

Slightly windblown but nonetheless enjoying the New Mexico State Picnic are, left to right, front row: W6EHA, W5UXW, DRA, RQK and ZER. Back row: W5ZA, RZJ, RFK. TDB, ZEV (behind TDB), YAS and RTS. Photo by A5RNT.

Ionospheric Propagation Conditions

Forecasts by GEORGE JACOBS, W2PAJ

144-40 72nd Ave., Flushing, L. I., N. Y.

DX Contest Analysis — Part 1

Time is drawing near for another World-Wide DX Contest. This year's first contest week-end will start on October 24th at 0200 hours GMT, ending at 0200 hours October 26th. The second contest week-end will start on October 31st at 0200 hours GMT, and will end at 0200 on November 2nd. As has been the custom for the past two years, our next column will be devoted to a special analysis of propagation conditions for the contest periods, including data and information that can help in building up scores.

In order that our overseas readers will have propagation data in time for the contest, this month, in addition to the regular September *Propagation Charts*, there are included special charts that should be helpful to amateurs in other areas of the world. These charts are predicted for the period from October 1, until November, 15, 1953. These special *Propagation* Charts can be used by *CQ* readers in Europe, Central and South America, Africa, Asia and Australasia to determine optimum times and the amateur bands to use in order to work the greatest number of countries and zones.

Ionospheric disturbances will most probably occur during Sept. 5-7, 12-15, 18-21, and 24-25. Periods of good short wave radio conditions are expected during Sept. 1-2, 9-10, and 28-30. Normal propagation conditions are presently forecast for the DX contest periods.

Letters received from readers who made use of the *Propagation Charts* during the past two contests, indicate, that the "work plan" devised for these charts were extremely helpful in piling up the points. These "work plans" are operating schedules indicating the band that has the best possibilities of providing QSO's with the most Continents and Zones for any hour of the day. The "work plan" is of course devised from information appearing in the *Progapation Charts*. A typical one for a European QTH is shown below. Similar "work plans" can be devised for other QTH's and other operating conditions simply by referring to the *Propagation Charts*.

It is a little early to determine with any degree of accuracy whether propagation conditions will be normal or disturbed during the contest periods. It is suggested that WWV transmissions be monitored for information on radio conditions during the contest. Propagation information is given at 19 and 49 minutes past each hour on frequencies of 2.5, 5, 10, 15, 20 and 25 mc. If conditions are disturbed (WWV rating W1, 2, 3, or 4), concentrate on working paths that do not pass near or through the Auroral Zones. During disturbances, North-South paths usually remain in on 80, 40 and 20 meters, while East-West paths are workable on 40 and 80 meters.

Typical World Wide DX Work Plan
For European QTH

Time Period GMT	Recommended Band	Possible Continents	Possible Zones
0000-0600	40 or 80	N. &. S. America, Asia, Europe, Africa	1-13, 14-17, 20-22, 33-40
0600-1000	20	S. America, Africa, Asia, Australasia	10-13, 16-19, 20-39
1000-1400	15	N. & S. America, Africa, Asia, Australasia	2-13, 20-23, 26-30, 32-40
1400-2000	20	N. & S. America, Africa, Asia, Australasia	1-17, 20-23, 28-40
2000-0000	40	N. & S. America, Africa, Asia	2-27, 33-40

All forecasts appearing in this month's *Propagation Charts* are based primarily upon basic data appearing in the National Bureau of Standards D series. The September forecast is based upon a predicted smooth sunspot number of 18 and October data on a sunspot number of 17. Forecasts are based upon an assumed effective radiated c-w power of 150 watts or approximately 1 kw. effective radiated AM phone power. Effective radiated power is equal to the power fed into your antenna multiplied by the antenna gain as compared to a horizontal half-wave dipole, a half wavelength above ground. Deviations in power up to 6 db. from these values will usually change the rating indicated in the propagation charts by one number.

Good luck to overseas readers during the contest—and I would like to hear from those of you who may find this propagation data useful.

General Propagation Conditions

10 METERS—DX poor, but possible on some North-South circuits, sporadic E short skip openings decreasing.

15 METERS—DX fair and improving, especially during latter part of month and early October.

20 METERS—Band closing a bit earlier, but DX conditions fair to good.

40 METERS—Dx fair and improving with stronger signals and less noise.

80 METERS—DX poor to fair but improving.

160 METERS—Still too early for DX openings, but improving and becoming less noisy.

Next month will be devoted to a special contest propagation analysis for all areas of the United States.

ALL TIMES IN GMT

WESTERN EUROPE TO:	15 Meters	20 Meters	40 Meters	80 Meters
East & Central USA	1330-1800 (2-3)	1130-1300 (3) 1300-1700 (2) 1700-2000 (3-4)	2200-0600 (3-4)	2300-0500 (2-3)
Central America	1200-1700 (2-3) 1700-1900 (3-4)	1100-1700 (1) 1700-1900 (2) 1900-2100 (3)	2300-0500 (2-3)	0000-0400 (1-2)
South America	1400-1700 (1-2)* 1000-1200 (2) 1200-1700 (1) 1700-1900 (2-3)	0800-1000 (2) 1000-1800 (1) 1800-2000 (2-3)	2230-0600 (2-3)	0000-0400 (1-2)
South Africa	1000-1600 (3-4)* 0700-1700 (3-4)	0600-0800 (1-2) 0800-1500 (1) 1500-1800 (3-4)	1800-0330 (3)	1900-0300 (2)
India/Pakistan, etc.	0700-1300 (2-3)	0600-1200 (1-2) 1200-1600 (3-4)	1630-0030 (2-3)	1700-2100 (1-2)
Japan & Far East	Nil	0700-1000 (1-2)	2000-2300 (0-1)	Nil
Australasia	0900-1300 (1-2)	0700-1200 (1) 1200-1500 (2)	1700-2000 (1)	Nil
Middle East & Central Africa	1200-1400 (1-2)* 0600-1500 (3-4)	0600-0900 (3) 0900-1300 (2) 1300-1700 (4)	1630-0330 (3-4)	1700-0230 (3)
AUSTRALASIA TO:				
West Coast, USA	2300-0200 (1-2)* 1930-0130 (2) 0130-0300 (3)	1800-0300 (1) 0300-0500 (2-3)	0600-1500 (3)	0830-1400 (1-2)
South Africa	0500-0800 (1)	0400-0600 (1) 0600-1000 (0-1)	Nil	Nil
Middle East/Central Africa	0300-0700 (2)	2030-2300 (2-3) 0300-0600 (1-2) 1100-1600 (1-2)	1500-1900 (2)	1600-1830 (1)
India/Pakistan, etc.	0100-0800 (2-3)* 2300-0900 (2-3) 0900-1100 (3-4)	2300-0900 (1-2) 0900-1700 (3-4)	1200-1900 (2-3)	1300-1800 (1-2)
Japan	2300-1000 (3-4)* 2200-0600 (3-4) 0600-1400 (4)	2100-0600 (2-3) 0600-1600 (3-4)	0900-1900 (3)	1000-1800 (2)
Central America	0100-0600 (1)* 2100-0400 (2-3) 0400-0700 (3-4)	2000-0200 (1) 0200-0600 (2) 0600-0900 (3)	0700-1100 (2)	0800-1000 (1)
South America	2300-0100 (1)	0900-1130 (2) 2100-0200 (1) 0200-0730 (2)	0700-1030 (1)	0800-1000 (0-1)
SOUTH AMERICA TO:				
India/Pakistan, etc.	0900-1300 (1-2)* 0130-0330 (1) 0800-1500 (1) 1500-1700 (1-2)	0100-0500 (2) 1700-2100 (1)	2300-0200 (1-2)	2330-0130 (0-1)
Japan & Far East	2200-0100 (1-2)* 2100-0300 (1-2)	2000-0300 (0-1) 0300-0900 (1-2)	0500-0900 (0-1)	Nil
Philippine Islands & East Indies	1330-1530 (1-2)* 2200-0500 (1-2)* 1300-1600 (1-2) 2200-0700 (2-3)	0000-0900 (1-2)	Nil	Nil
Eastern USA	1500-2100 (2-3)* 1230-2000 (2) 2000-2200 (3)	1200-2100 (1-2) 2100-2300 (3-4) 2300-0100 (1-2)	2300-0900 (3-4)	0000-0800 (2)
Western USA	1700-2300 (2-3)* 1500-2200 (2-3) 2200-0000 (3-4)	1400-2300 (1-2) 2300-0100 (3-4) 0100-0230 (1-2)	0200-1000 (3-4)	0300-0900 (2)
CENTRAL AMERICA TO:				
South Africa	1500-1800 (1-2)* 1700-2000 (1-2)	2000-0200 (1-2) 0530-0700 (1)	0200-0600 (1)	Nil

ALL TIMES IN GMT

CENTRAL AMERICA TO:	15 Meters	20 Meters	40 Meters	80 Meters
Middle East	1100-1500 (1-2) 1500-1700 (2-3)	1700-1900 (1-2)	2300-0330 (1-2)	2330-0200 (1)
North Africa	1500-1800 (1-2)* 1200-1800 (2-3) 1800-1900 (3-4)	1100-1800 (1-2) 1800-2100 (3)	2230-0700 (2-3)	2300-0630 (1-2)
Central USA	1600-2100 (2-3)* 1300-2300 (4)	1200-2100 (3-4) 2100-0000 (4-5)	0000-1100 (4-5)	0100-1000 (3-4)

ALL TIMES IN EST

EAST COAST TO: (Centered on Washington, D. C.)	15 Meters	20 Meters	40 Meters	80 Meters
West Europe	1200-1500 (0-1)	0700-1400 (3) 1400-1530 (4) 1530-1700 (2)	1800-2300 (3-4) 2300-0200 (1-2)	2000-0100 (2-3)
Central Europe	1100-1500 (1)	0700-1300 (3) 1300-1600 (3-4) 1600-1730 (1-2)	1800-0100 (3)	2000-2300 (2)
Southern Europe & North Africa	1200-1330 (1) 1330-1530 (1-2)	0630-1300 (3) 1300-1600 (4) 1600-1730 (1-2)	1730-0000 (3)	1900-0000 (2-3)
Central Africa	0900-1530 (1-2)	0630-1300 (1-2) 1300-1600 (2) 1600-1830 (2-3)	1800-0000 (2-3)	1900-2200 (2)
South Africa	0930-1430 (1-2)	0630-1330 (0-1) 1330-1530 (1) 1530-1730 (2)	1800-2300 (2)	1900-2200 (1-2)
Near & Middle East	1100-1300 (1)	0630-1230 (1) 1230-1400 (2-3) 1400-1530 (1-2)	1930-2300 (1-2)	2030-2230 (1)
South America	1330-1700 (1-2)* 0900-1600 (2-3) 1600-1830 (3-4)	0700-1600 (2-3) 1600-1900 (3-4) 1900-2030 (1-2)	1800-0430 (3)	1930-0400 (1-2)
Hawaii	1730-1930 (0-1)	1100-1230 (1-2) 1230-1930 (1) 1930-2130 (2-3)	2200-0100 (3) 0100-0530 (1) 0530-0700 (2-3)	2330-0600 (2)
Australasia	Nil	0800-1000 (1-2) 1600-2000 (0-1) 2000-2130 (1)	0100-0630 (1-2)	0200-0600 (1)
Guam & Pacific Islands	Nil	0800-1000 (1-2) 1500-1930 (0-1) 1930-2100 (1-2)	2300-0630 (2)	0000-0600 (1-2)
Japan	Nil	0700-0900 (1) 1600-2000 (1)	0400-0700 (1)	Nil
Philippine Islands & East Indies	Nil	0700-0900 (0-1)	0300-0600 (0-1)	Nil

ALL TIMES IN CST

CENTRAL USA TO: (Centered on St. Louis, Mo.)	15 Meters	20 Meters	40 Meters	80 Meters
West Europe	1200-1530 (0-1)	0700-1400 (2-3) 1400-1530 (3-4) 1530-1700 (1-2)	1800-2130 (3-4) 2130-0200 (1-2)	2000-0100 (2-3)
Central Europe	1200-1500 (0-1)	0700-1400 (2) 1400-1530 (3) 1530-1700 (1-2)	1800-2100 (3) 2100-0100 (2)	2000-2300 (2)
Southern Europe & North Africa	1400-1630 (1)	0630-1400 (3) 1400-1630 (4) 1630-1800 (1-2)	1700-0130 (3)	1900-0030 (2-3)
Central Africa	0900-1600 (1-2)	0600-1300 (1) 1300-1600 (1-2) 1600-1800 (2-3)	1730-2230 (2-3)	1830-2130 (2)
South Africa	1000-1500 (1-2)	0600-1300 (0-1) 1300-1530 (1) 1530-1800 (2)	1730-2200 (2)	1830-2130 (1-2)

ALL TIMES IN CST

CENTRAL USA TO: (Centered on St. Louis, Mo.)	15 Meters	20 Meters	40 Meters	80 Meters
South America	1200-1630 (2)* 0900-1500 (2-3) 1500-1800 (3-4)	0600-0800 (3) 0800-1600 (2) 1600-1800 (4) 1800-2130 (2)	1730-0400 (3) 0400-0530 (1-2)	1900-0400 (1-2)
Hawaii	1400-1900 (1-2)	1000-1200 (2-3) 1200-1900 (1-2) 1900-2130 (3-4)	2300-0200 (3-4) 0200-0730 (2-3)	2330-0600 (3)
Australasia	1530-2000 (1)	0630-0930 (1-2) 1400-1900 (0-1) 1900-2100 (1) 2100-2330 (2)	0000-0700 (2)	0130-0630 (1)
Japan	Nil	0730-0930 (1-2) 1400-1900 (1) 1900-2130 (1-2)	0200-0730 (1)	0330-0630 (1)
Philippine Islands & East Indies	Nil	0730-1000 (1)	0400-0700 (1)	0430-0530 (0-1)

ALL TIMES IN PST

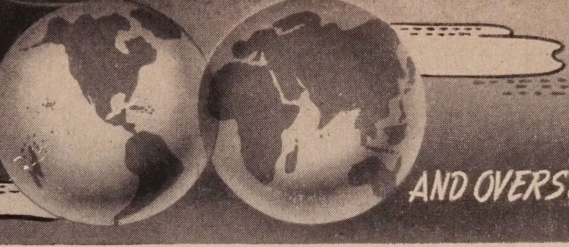
WEST COAST TO: (Centered on Sacramento, Calif.)	15 Meters	20 Meters	40 Meters	80 Meters
Europe	Nil	0800-1300 (1) 1300-1400 (2)	1800-2300 (1)	1900-2200 (0-1)
South Africa	1200-1400 (0-1) 1400-1600 (1)	0700-1300 (0-1) 1300-1700 (1-2) 1700-2000 (2)	1800-2200 (2)	1900-2100 (1)
South America	1200-1600 (1-2)* 1000-1500 (2-3) 1500-1730 (3-4)	0600-1500 (2) 1500-1800 (3-4) 1800-2000 (1-2)	1800-0100 (3) 0100-0400 (1-2)	1900-0400 (1-2)
Australia	1600-1800 (1)* 1200-1330 (1-2) 1330-1900 (1) 1900-2000 (1-2)	1100-1930 (1) 1930-2130 (2)	0100-0600 (2-3)	0200-0500 (1)
New Zealand	1500-1900 (1)* 1100-1800 (2) 1800-2100 (2-3)	1000-1900 (1-2) 1900-2100 (2-3) 2100-2230 (1-2)	2300-0500 (2-3)	0000-0430 (2)
Japan	1600-0030 (1-2)	1200-1900 (2-3) 1900-2130 (3-4) 2130-2330 (1-2)	0000-0530 (3)	0100-0500 (2)
Philippine Islands & East Indies	1600-2000 (1)	0800-1100 (2) 1400-2100 (0-1) 2100-2300 (1)	0300-0500 (0-1)	Nil
Malaya	1700-2000 (1)	0730-1000 (1) 1600-2100 (0-1) 2100-2300 (1)	0500-0630 (0-1)	Nil
Marshall Islands	1500-1900 (1-2)	1000-1900 (2-3) 1900-2100 (3-4) 2100-2230 (1-2)	2300-0630 (3)	0000-0530 (2)
Guam & Mariana Islands	1300-1600 (1) 1600-2000 (2)	0730-0900 (1) 1200-1900 (2) 1900-2230 (3)	0000-0530 (2-3)	0100-0430 (1-2)
Hong Kong, Formosa & Macao	1500-2000 (1)	0800-0930 (1) 1400-2000 (1-2) 2000-2300 (2-3)	0200-0600 (2)	0300-0500 (1)
Siberia	1800-2100 (1)	1400-1900 (3) 1900-2130 (4) 2130-2330 (1-2)	0000-0400 (3-4)	0100-0330 (2-3)

Symbols For Expected Percentage Of Days Of Month Path Open:

(0) None (1) 10% (2) 25% (3) 50% (4) 70% (5) 85% or more.

* Indicates time of possible ten-meter openings.

DX AND OVERSEAS NEWS



Gathered by DICK SPENCELEY, KV4AA

Box 403, St. Thomas, Virgin Islands, U. S. A.

We welcome the following new arrivals on the HONOR ROLL:

VE8AW	**39-178**
DL1KB	**39-154**
W3AXT	**35-126**

The Word Gets Around—
With QRM ! !

VK5— de VS1XX: "Sa OM, A PA0 will go to the Laccadive Islands some time this month. His name is Jan. All QSL's go via Box 400 Amsterdam . . ."

ZL4— de VK5—: "Hr DX dope OB. Just heard that a PA0 will go to Amsterdam Island this month but lacks gear at present. His name is Jan and he will QSL 100 pc . . ."

W8— de ZL4—: "Good news OM, A PA0 will leave Amsterdam this month for a rare DX spot. His name is Jan. Many will be after him . . ."

VS1XX de W8—: "Sa OM hrs DX tip. A PA0 will go to Jan Mayen this month. Watch for him . . ."

W8— de VS1XX: "(Later) Tks for FB tip OM. I QSO'ed LB6XD, Jan Mayen, this AM. FB Service!! . . ." "Congrats!! . . ."

At Time of Writing

SAO TOME AND PRINCIPE IS.: Phone activity is reported from this spot by W3JNN who contacted CR5SP. This station is on VFO and seems to know little English. QSO was made on 14210 at 2200 GMT. See QTH's.

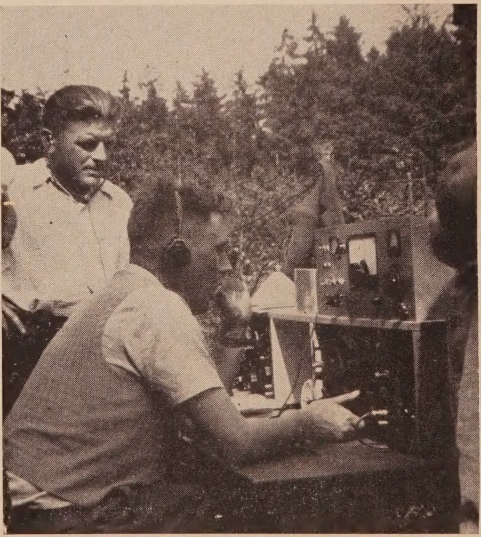
RIO DE ORO: It is reported that EA2CN and another EA Ham will set up shop at this QTH. No definite dates as yet.

COCOS ISLAND, TI9: We are advised that TI9UXX who was scheduled to make a very short stop at Cocos around July 18 could not be in the vicinity on that date. Instead he will be close to another very rare DX spot and every effort will be made to get ashore. TI9UXX activity will be delayed until a later date. Evan wishes it known that he is doing his best to hit these spots but many factors prevail which are preventing definite scheduling.

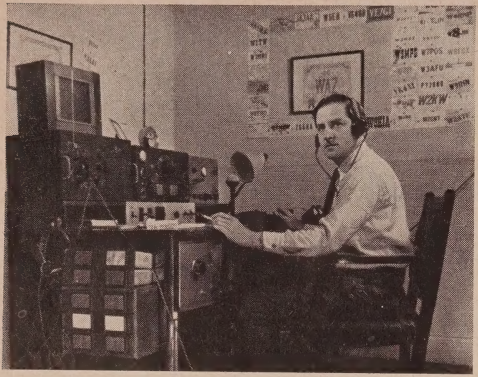
TOKELAU, UNION ISLAND; ZM7 (?): ZL3JA is seriously considering a radio expedition to this rare spot. Should this noble enterprise become a fact, an American dollar will be asked for each QSL to defray, in part, the expenses of the trip. ZL3JA informs us that the Union group, near Samoa, consists of 4 atolls, 1 white man and 1200 natives. A plane from Fiji visits this spot four times a year. Of considerable interest is the fact that one of the islands, Swains Island, is a U.S. possession governed from Samoa . . . We will keep you informed.

EASTER ISLAND, CE0: Last word on this one is that CE0AA should have shown up about August 4th.

WALLIS ISLAND, FW8: VK3FH reports, via FK8AO, that FK8AB was due to visit this spot around July 15. Much activity was planned on 3.5, 7, 14 and 21 Mc. CW/NBFM. The call of FK8AB/Wallis was supposed to have been used.



Field Day enthusiasm also runs high in Switzerland. Here is Hans, HB9HT, in operating position while Emil, HB9LO, looks on.



Very active on the island of Cyprus is George Barrett, ZC4IP, better known to some, since 1936, as G8IP. 5½ months on the air from ZC4IP have resulted in 1,586 QSO's in 97 countries and 33 zones. Decorating the wall is WAZ certificate No. 120 achieved at G8IP. The transmitter, not shown, runs 120 watts input on 14 and 21 while separate rigs run the same input on 7 and 3.5 Mc. The receiver is a fifteen year old HRO.

SOVIET ARMENIA (?), UG6KAA: This station has been on recently working W's. He gives his name as 'Tez' and volunteers the following info which we pass along to you for whatever it may be worth: USSR stations have the call letters of KAA, KAB, KAC or KK are permitted to work W's after July 1st, also, UJ8KK, at the Tadzhik base, will be on daily after July 13. A beam check on UG6KAA between W8BRA and KV4AA showed his signals emanated from the general direction of El Paso, Tex. and no reports of other USSR contacts have been reported to confirm the above. UG6KAA was on 14019 at 1550 GMT.

G2RO/DX: W4CEN, who contacted this station during his activity at VQ5RO, advises that this station will visit British Colonies all over the world during the next year and a half. The rig runs 15 watts and the frequency most used will be 14039 kc. (also heard on 14015). His itinerary is as follows: VQ1RO, Zanzibar, from Sept. 1 to Sept. 10; VQ8RO, Mauritius, from Sept. 10 to Sept 20, then two weeks in London, then three months in Asia, Sarawak, Borneo and Hong-Kong followed by two more weeks in London. From there he will go to the West Indies, Guianas, Falkland Islands, etc., and then back to London for another two weeks. The next three months take him to the islands of the South Pacific and after another two weeks in London he winds up his trip with a three-month jaunt to West Africa. This tour should give you DX men something to chaw on for some time to come. QSL's go via G2RO c/o RSGB.

DIRECTION ISLAND, ZC2AB: (Via VK6MK and West Gulf Bulletin) New activity soon on Direction Is. The call ZC2AB will be licensed by the Malayan Government since this island is a separate administration.

DX News in General

G2MI says new prefix for Ceylon will be **4F7** and not 4S7 as previously mentioned . . . VK6MK says no activity on **Heard Island** at present . . . **VK1HM,** Cocos, is on every other week-end from 0600 to 1000 GMT. He should be on week-ends of Sept 6 and 20, etc. . . . W5BGP nabbed VK1HM, A3, 14172 kc., 0700 GMT, June 28 . . . **VK1BJ,** Cocos, hits 21 Mc. lots but may also be found on 14 . . . **JY1XY,** it is rumored, will spend a month at YA3XY with A3 operation . . . **MP4ABW,** Qatar, may be heard around 14110 on phone . . . CM9AA, via West Gulf DX Bulletin, reports **M1B** active on phone from San Marino, 14210 kc. 2100 GMT . . . Also via WGB: W2DX visited W2AOS/KG6 on his way to Taipeh, Formosa. Watch for another C3 . . . W5NZE reports **KS6AB** active on phone, 14290 in the evenings . . . From CR9AH we learn that the 1st op of old CR10AA now holds the call of **CR8AA,** Goa, but hasn't been heard on the air as yet. The 2nd op of CR10AA is still in Timor but lacks the equipment to get on the air . . . **ZC5VS** plans a trip to Sarawak as soon as weather permits . . . HZ1MY's new CN8 call is **CN8HF.** Dick still awaits equipment to get on from CN8, Ifni and Rio de Oro . . . **PJ2AA** vacations in Holland until end of November and, accompanied by HB9LA, had planned to be active in Corsica around the end of July. Attempts to obtain permission to operate in Vatican City met with no success . . . **CR9AH,** Macau, advises that **CR9AE, CR9AF** and himself account for all the activity from this spot. Johns old call, CR9AG, is now held by Tiny Houghton of VS6AM who at times drops over to Macau for some DX. CR9AI will also be on upon issuance of license. CR9AH is usually found on xtl 14080 but shifts to VFO if QRM is too tough. Ex-CR9AB is presently in Montreal, Canada . . . G3APX reports that FN8AD's call is now **VU2AX** but he 'naturally' prefers to use the FN8 prefix altho it has no special status any more . . . Those who may have worked **VQ2RCC** from July 11 to July 14 will be rewarded with a special QSL. This

Left, we see (L to R) W6CMY, Ray Feeney, just out of the Navy; W6SUP, Bob Metke, at whose shack this was taken, and KA2LG, now back in Japan. Ray goes after the 7-Mc CW DX while Bob and KA2LG do a lot of phone patching on 14 Mc.

Snapped at the recent I.A.R.U. Region I Congress in Lausanne were, left to right, Dott. R. Sesial, I1FA; Francine Mertens, ON4MF; Art Milne, G2MI; W.J.L. Dalmyn, PA0DD; J. Clarricoats, G6CL; M. Compaignon de Marcheville, F8NH; R. Faessler, HB9EU and Dott. G. Sommer, I1WMS. (Photo courtesy of H. Pless, OE-1-384)

station marked an exhibition in connection with the Rhodes Centenary Celebrations in Northern Rhodesia . . . W6TMP reports **VR6AC** is back on Pitcairn Island now and may be heard near 14040 around 0430/0530 GMT. He uses primary keying and signal has very strong back wave. Jerry received a QSL from him for QSO on Dec. 22. See QTH's . . . W6NZW says a VK7 will arrive in VR4 in August and also that VU2ET told him there would be an AC4 station on in August . . . W6RW reports GM3DHD will be in VQ9-land in August while W7PGX advises **KC6AA** is on Yap Island. Yap is far enough from the Palau group, in our opinion, to be a separate one. Its status could be compared to Norfolk Is., VK9, which is separate. QRG was 14198 CW. Lis also reports **FU8AC,** 14017 kc, 0400/0500 GMT . . . W7RT heard **VK1HM,** Cocos, 0900 GMT, 14180 A3 . . . ON4AU heard **ZC2AX,** 14055, 15/1600 GMT . . . ZD6HN left G'land around June 22 and should now be QRV in Nyasaland with a new 150-watt rig sent by W5AVF/W2CTO . . . KH6ER QSO'ed a **TT0AD** on 7 Mc . . . **CR5AA** has been active on 14055 kc. 2000 GMT . . . W6MUR skeds **VP2MD** 0100/0130 **GMT,** 14017 . . . Contradicting an earlier report **EA4BH** say he will not be on from Rio de Oro each week-end but he will probably go there some time in October for a ten day stay at which time he will QSO as many as possible . . .

Exploits

W2ZVS ran his total up to 151 with YI2AM, SU1HS, EA0AB, CR5AA and MP4BBD . . . **W6MHB** rose to 197 with SU1SS and OD5LX . . . **W6LGD** made it 157 with FF8AG, PJ5ZO . . . **W1RAN** nabbed SU1CN for No. 144 . . . **W0NCG** A3'd to 154 with SU1MR, CT3AN, VS2BS and 9S4AH while **OE3CC** submitted new list putting him on 189 . . . **W4EPA** added VP5BF, HI8AF, OD5LX, FK8AO and 3A2AY to reach 140 . . . **W4RBQ** ups to 191 with EA9DC, VP5BH and YI3BZL . . . **W9HUZ** reaches 196 with ZC5VS and VQ5RO . . . **W6KYV** comes up to date with 22 additions for 170 while **W4LQN** also adds 22 to reach 152 . . . **W6SYG** steps up one to 238 with OD5AD . . . **W6ZZ** completed his WAS on 21 Mc. with W7JU, Nevada. This completes WAS on all bands for Miles who, at W1WV, received WAS Certificate No. 1 on Jan. 8, 1936 . . . **W8YIN** submits lists for 34-154 and 33-105/A3. Lack of space prevents us from listing 34 Zones, CW, and 33 Zones, phone, so we have sent Mickey chasing after one more zone . . . **LU6AX** reached 165 with ZS8D, CT2BO, EA6AF, CR5AA, VQ5RO and SV0WG . . . **T12TG** nabbed M1B for 213 and is currently chasing 3A2AY . . . **W6RW,** with W6BXL, made 462 contacts during FD . . . **OH2RY** went to 188 with VP5SC . . . **OK1MB** nabbed CR5AA, ET2KA and ZC3AA (?) . . . **W4GD** ups to 160 with EA8BK, VK9GM (Norfolk Island, 7030 kc.), VK1AB, VS9AP and MF2AG . . . **PJ2AD** added MP4BBD and HV5XX (The latter probably being 'you know what') . . . **W6TXL** made it 149 with CR9AH and OD5AD while **W9HUZ** pulled in VQ5RO for a new one . . . **W5VIR** snagged KA0IJ . . . **W4BRB** is up to 108 on 3.5 Mc. with 106 confirmed . . . **OA4ED** keyed with MP4BBD, JA1AH, SU1SS, ZK1BG, VP8AK, ZC4IP and 4X4RE, all between 14010 and 14020. Terry now stands at 35-115 . . . Overheard QSO'ing **ZC5VS** one fine morning were W8DAW, W5DML, W5LXY, W5NMA, W6DBP and W6NZW . . . **W5AVF** added ZK2AA.

WE CAN YAP AND YAP on the subject of operating ethics but one practice which, if adhered to, would be the biggest thing since bubble gum, is this:

Listen on your frequency for five minutes before putting your station on the air. This will allow you to hear at least one side of any QSO's which may be in progress. If your frequency is thus engaged then shift to a frequency not in use. Outside of contests this can usually be found. The resultant decrease in QRM will be a joy. This goes for you, licensed in 1912. Especially you, licensed in 1953. And . . . ME! !

Here and There

Doug Taylor of ZC4DT, ex-VT1AC, should be on now in Kenya with the call of **VQ4EI** . . . Several VS6 boys

The practically unbeatable W6 DX Contest combination of Wendell Peirce, W6FSJ, on the left, and Warren Davis, W6IBD, on the right. Photo, taken in W6IBD's shack, shows 75A1 receivers and 32V2 transmitters which drive PP 250TH's or 450TH's on all bands. Antennas consist of a Dipole on 3.5, Ground Plane on 7 and three element beams on 14, 21 and 28 Mc. These are all fed with the famous Davis version of the Gamma match. Warren has recently moved to Haddonfield, N.J., where the call of W2IBD will give East Coast competition something to worry about. (Photo Courtesy of No. Calif DX Bulletin)

W. A. Z. HONOR ROLL

CW & PHONE

WAZ

W1FH	253
W6VFR	249
W6ENV	246
W3BES	245
G6ZO	244
W0YXO	243
W2BXA	243
W6SN	241
W3GHD	241
W3JTC	240
W8BHW	239
W6AM	239
PY2CK	239
W3GAU	239
G6RH	239
W8JIN	238
W3EVW	238
W6SYG	238
W6GRL	237
W3KT	237
W8NBK	237
W2AGW	237
W6ADP	236
W6MEK	236
W3CPV	235
W7AMX	235
W6MX	235
LU6DJX	234
VE4RO	233
W6AMA	233
G4CP	232
CE3AG	232
W7GUI	229
W8BFA	228
ZI2GX	228
W6GDJ	228
W6EBG	227
W6PFD	226
VK2ACX	226
W7DL	225
W6TS	225
VK3BZ	223
W3LOE	222
W6FSJ	222
W6DZZ	222
W3BHV	222
W6MVQ	221
W6PB	221
G6QB	221
W7BD	220
W6ITA	219
DL1FF	219
W6VE	219
W6TT	218
W0NUC	218
W6PQT	218
G2PL	218
KH6IJ	218
W0PNQ	217
W9DUY	217
W9NDA	216
W6DLY	216
W2PEO	215
W3JNN	215
W6SAI	215
W3IYE	214
PY1DM	214
ZS2X	214
KH6BA	214
W6TI	214
W6OEG	213
W4AIT	213
KH6CT	213
VK4HR	213
W6RBQ	213
W6HX	212
VE7HC	212
OE1CD	212
W6NNV	211
W0DU	211
W8HGW	211
W6BPD	210
W6MJB	210
W6IBD	210
W6CYI	210
W9VW	209
W6RW	209
W6EFM	209
W6UHA	209
W2AQW	208
ZL1HY	208
W6EPZ	208
W6SC	207
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W4BPD	206
W0ELA	206
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W6ZCY	204
W6DI	204
W6PKO	204
VK2DI	204
W6AVM	204
DL7AA	204
W4CYU	203
W9MXX	197
ZL1BY	203
W6HJT	203
W6RM	202
W6OMC	202
W6AOA	202
W6BUD	202
W5GEL	201
W9KOK	200
VK5JS	200
W7OY	200
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W6SRF	198
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W6BAX	197
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W6MHB	197
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W6KUT	174
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VE7VO	162
ZS6DW	162
I1IR	162
W6PDB	161
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VE3EK	160
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JA2KG	160
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W0FFV	158
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W6CYI	157
G3TK	157
W6BUY	157
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W7BE	156
KH6IG	156
VK5KO	155
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G2IO	154
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W6KEV	153
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W6FHW	153
G3YF	152
KP6AA	152
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W6LER	150
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W7DXZ	14
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VE6GD	146
VS6AE	146
W9NRB	145
W6MUC	145
OK2SO	145
ON4TA	144
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KG6GD	143
W3IXN	141
W6AOD	14
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W6ONZ	139
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OK1WX	135
W7BTH	135
G3AZ	133
W6TEU	133
W6RDR	133
W6AUT	133
W6OBD	131
ZS2CR	131
CR9AH	131
W6IDZ	130
W6BIL	130
W7ASG	129
W7GBW	127
G8IP	127
G5BJ	126
VK6SA	126
PK6HA	124
G5VU	124
W6NRQ	123
W6MLY	123
ZL1GX	122
VK5MF	121
W6BUO	121
ZL2CU	120
ZS2EC	116
ZS6CT	113
KG6AL	103
W7KWA	98
W6DUB	89
W7IYA	59

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W8KIA	235
W9RBI	230
W2NSZ	230
F8BS	229
W3DPA	226
W2WZ	226
W3OCU	224
W1ENE	225
W3EPV	223
4X4RE	220
W9LNM	217
W1JYH	217
W1HX	214
W1GKK	211
W1BIH	209
W5LVD	209
W8SYC	209
W3DKT	209
W2HHF	208
W4GG	207
W8HFE	207
W9FKC	207
VE3QD	206
W5MPG	206
F9BO	204
VK4FJ	204
W2BJ	202
KP4KD	200
W9IU	201
W1ZL	201
W2HZY	200
W3JKO	200
W5FFW	200
W7PGS	197
SM5WI	196
W9HUZ	196
W2EMW	195
W3KDP	193
W2CWE	192
W4LVV	192
W2AGO	191
W1AWX	191
W4RBQ	191
OK1VW	190
GM3CSM	190
OE3CC	189
W0EYR	186
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W8RDZ	184
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W9YNB	155
DL1FK	155
I1AIV	154
DL1KB	154
W9NZZ	151
G3AKU	150
VE7VC	150
G6QX	150
W1ZD	150
W2GUR	146
OK1AB	144
TF3EA	142
VS7NX	140
W6MUF	136
W6KYT	135
W7HXG	134
VE7KC	133
W7ETK	132
W6TE	131
W6WJX	131
W5CPI	130
W6NZ	129
KL7UM	129
DL1DA	127
W6EYC	126
VR5PL	124
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W6JWL	114
KL7GG	114
W6FBC	114
W6VAT	110
DL3AB	107
W7GXA	105
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W6FXL	93
W7LEE	91

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W0TKX	181
W2PUD	181
W5KUJ	181
W2SHZ	175
W8KPL	173
W8FJN	173
W2GVZ	173
W8EYE	172
W3FYS	172
GM2UU	165
VE2BV	163
W1BFT	163
I1UV	160
ZL3CC	159
W3LVJ	158
W2UEI	156
LU7CD	155
W4LQN	152
W5MET	150
TF3SF	145
W8ZMC	143
W0AZT	143
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W6ETJ	139
W9FKH	135
VE3ACS	134
MP4BAD	133
W4FPK	131
W2PQJ	130
W3ZN	129
EA1AB	129
W9MZP	126
FE8AB	126
W9TB	122
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W0FET	118
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W6CAE	113
W7EYS	107
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W1KFV	173
OZ7BG	171
W2ZA	160
IS1AHK	160
W2WC	158
W3WU	157
F9AH	157
W9LI	151
W4IWO	149
W9WCE	142
OE1FF	142
W4ML	140
W4EPA	140
ZL1QW	138
W1APA	136
W2AYJ	133
W7HKT	130
W4DIA	129
VE5JV	126
W9LNH	122
OH3OE	118
W6YX	117
VE1EA	116
G3BPP	112
W6AX	110
W0FWW	108
W7PK	104
W8HSW	104
W2BLS	99
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W4HA	172
GM2DBX	165
W2OST	163
W2ZVS	151
W3MZE	150
I1IT	140
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W3AYS	137
OA4AK	128
VE1PQ	128
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W5CD	108
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W1DEP	159
W5FXN	153
W1RAN	144
W4DHZ	132
W9CKP	132
W1MRP	130
W6ZZ	129
W3AXT	126
W5AWT	123
OE5YL	122
W9RQM	119
CO6AJ	119
ZL3CP	117
W0GBJ	116
W9GDA	115
W9FNR	114
W8AVB	113
W2HAZ	112
I1ER	112
KZ5IP	108
KL7CZ	80

PHONE ONLY

39 ZONES

VQ4ERR	220
PY2CK	219
XE1AC	217
W3LTU	206
W6DI	203
W6VFR	178
G8IG	179
PK4DA	175
W7HTS	161
W8HUD	161
F9BO	158
VE7ZM	145
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38 ZONES

W9RBI	202
W2BXA	198
W9NDA	173
W6AM	167
W6KQY	161
W4CYU	160
ZL1HY	157
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37 ZONES

W1JCX	189
W3BES	189
CE3AB	186
W8REU	176
VK3BZ	173
W3GHD	170
G3DO	170
W7MBX	164
W9HB	161
GM2UU	158
W6WNH	15
W6PXH	153
W3JNN	150
W8BF	146
W6TT	143
F8VC	124
W7MBW	112
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36 ZONES

W1NWO	202
W1MCW	202
ZS6Q	173
W1BEQ	164
GM2DBX	163
W4ESP	159
W2DYR	140
W9BZB	139
W9HP	139
W8AUP	131
W8PDB	130
VE3BNQ	130
W4INL	129
W1FJN	128
G6BW	127
VE7HC	123
W0HX	120
W8CYL	112
W3DHM	96
W6SA	92
F8DC	87

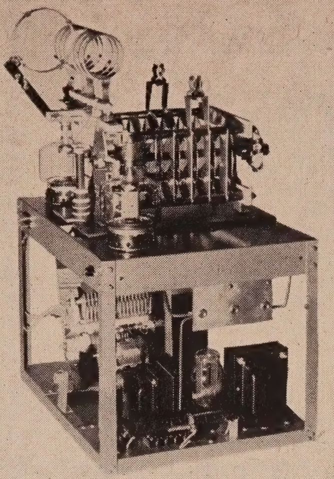
35 ZONES

HC2JR	171
W5JUF	171
W5ASG	170
W4HA	164
W3EVW	162
W9RNX	155
W0NCG	154
W6PCK	148
W9BVX	148
W0ANF	141
W2GHV	137
W2RGV	136
W6CHV	135
W0PUE	135
HC2OT	134
W0EYR	131
W0PRZ	124
W9CKP	124
G8QX	123
W8ZMC	122
W6YX	110
W5LWV	108
W4OM	106
W3PA	105
PY2JU	103

34 ZONES

W3KT	157
YV5AB	149
I1AXD	130

Keying the Kilowatt



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If you are perfectly satisfied with your keying, you can easily skip over this article. If, however, like most of us, you feel that your situation can be improved upon, we think you will find some ideas to help you achieve that goal, whether you key a kilowatt or a Novice 20 watter.

—Editor

Nothing can be so frustrating as to have an apparently incurable keying defect. This is particularly true in a kilowatt transmitter, where one that would be only mildly annoying with low power may spray clicks and chirps far and wide. Although this article describes techniques especially useful in obtaining clean, high-speed keying in a high-power transmitter, they apply equally well to keying low-power transmitters.

Ideally, with the key down, the transmitter should be on the air; with the key up, it should be completely dead. Under these conditions, full "break-in" operation is possible, because you can monitor the frequency of the station being called or worked between dots and dashes. Such operation adds a new thrill to CW for operators who have never experienced it.

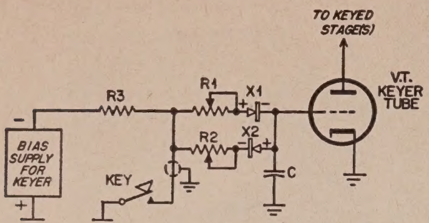
"Break-in" is almost essential for successful contest work. It also offers a definite advantage in DX dog fights. You can hear the DX come back to someone else (if it does) and avoid a lot of needless calling.

The first requirement for good "break-in" keying is that there can be no transmitter output with the key up. This means that we can (a) let the oscillator run continuously, but shield it so well that it cannot be heard in the station receiver, and key the following stage; (b) use some type of heterodyne v.f.o. and key its mixer; or (c) key the oscillator.

Shielding an oscillator well enough so that it cannot be heard in a sensitive receiver a few feet away is not easy. Some DX men claim they can hear two wires scraped together in Zanzibar. Assuming that a one-microvolt signal *can* be detected, a v.f.o. on 1.75 Mc. with 150 volts on the plate and around seven-per cent harmonic output will require shielding and decoupling sufficient to attenuate the signal about 100 db. to be inaudible on the higher-frequency bands. That's a lot of db.

Even with good shielding, a v.f.o. usually puts an S4 to S7 signal (local scale) into the station receiver. This is sufficient to completely mask an S7 signal (DX scale) on the same frequency. For the present, let's rule out the continuously running oscillator and investigate the other methods.

A heterodyne-type v.f.o., in which the output of two oscillators is combined in a mixer stage to determine the transmitter frequency, provides an excellent way to achieve high frequency stability. Also keying the mixer permits chirpless keying. But the units of this type that have been described [24, 25, 26, 27, 28] are more complicated than a conventional v.f.o. They also produce spurious outputs, unless they are carefully engineered. Even when these outputs do not reach the antenna, they are audible as "birdies" in the station receiver.



C—0.001 to 0.05 μfd.
R1, R2—2 megohm potentiometer
R3—200,000 ohms, 1w.
X1, X2—1N34 crystal diodes, or equivalent

Fig. 1. Typical vacuum tube keyer circuit. The addition of the crystal diodes in series with R1 and R2 permits independent adjustment of the "make" and "break" characteristic. The keyer tube is a low-mu triode. The bias voltage must be sufficient to cut off the plate current of the keyed stage with the key up.

They make it very difficult to set frequency with the receiver gain control wide open, as it becomes difficult to distinguish a "birdie" from the desired signal, making out-of-the-band operation surprisingly easy. With a double-conversion superhet, the "birdie" problem is even more pronounced.

What about keying the oscillator? "Horrors," you say. "You just can't get rid of clicks and chirps at the same time with oscillator keying." The usual pattern runs something like this: you key the oscillator and have clicks (and sometimes chirps). Installing a keying filter to combat the clicks brings on or accentuates the chirp. Tuning the stages following the oscillator always affects keying, and coupling the antenna to the final amplifier completely ruins the signal. Finally, you give up the idea of oscillator keying and try primary keying of the final amplifier or an earlier stage [6, 13] or go on phone. But, when done right, oscillator keying is no problem.

Designing A V.F.O. That Will Key Well

To key well, an oscillator must deliver output on the same frequency under widely varying plate (and screen) voltages.

The Clapp oscillator, although liable to drift with temperature variation, has a good frequency-versus-voltage characteristic. The Franklin, cathode-coupled, dual-tube oscillators and certain resistance-stabilized oscillators also exhibit good frequency stability with voltage change. Unfortunately, these later oscillators are low-output devices; therefore they require a lot of additional amplification to be usable as a transmitter v.f.o.

Even the ordinary electron-coupled oscillator using a 6SJ7 tube has a surprisingly high frequency-versus-voltage stability characteristic and keys excellently if careful attention is given to constructional details.

As a corollary to the principle that good oscillator keying requires that oscillations take place at the same frequency over a wide range of electrode voltages, the oscillations must start at low voltages. Time may be profitably spent in experimentally adjusting the feedback, plate-to-screen voltage ratio, gridleak resistance, and even the tank-circuit L/C ratio, so that the oscillations start at very low voltages and show a minimum of frequency variation as the voltages are raised.

The right ratio between plate and screen voltages is the key factor, and these voltages should be obtained from a well-regulated source. Lightly loading the oscillator is also highly important.

Sometimes, when an oscillator exhibits good characteristics above a certain minimum voltage, it is possible to add a "backwave control" in the form of a resistor across the key of such value that the tube barely continues oscillating with the key up. If the oscillator will operate on the same frequency from this point up to full voltage, a key filter may be added without producing chirps. Variations of this idea will be found in the references. [1-23]

Isolating The V.F.O. From The Transmitter

As already implied, the rest of the transmitter can affect the operation of a v.f.o. An untuned class A stage usually follows the oscillator in order to isolate it from such effects. However, a frequency doubler at this point will give much greater isolation. This follows from a consideration of the so-called "Miller Effect." Other things being equal, the dynamic input capacitance and conductance of a given tube is a function of its plate load impedance. The impedance of a tuned circuit at half its resonant frequency is much less than that of the r-f choke usually employed as the plate load impedance in the usual untuned stage (*especially when the tuned circuit is fairly high C*—Editor.); the doubler therefore is the better isolating stage.

Eliminate All R.F. Feedback

Phone men are familiar with the bad effects of r.f. in speech amplifiers. C-w operators often fail to realize that r-f feedback can be equally detrimental in a c-w transmitter. All too often, an oscillator may by itself work well, or the whole transmitter may do so when operating into a dummy load, but as soon as additional stages or the antenna are added, the note roughens up and the keying quality deteriorates. The reason is usually r-f feedback.

A balanced antenna system with low reactance at the transmitter end of the feed line is most helpful in keeping undesired r.f. out of the shack. A low-impedance, coaxial-fed antenna is also excellent, provided the line SWR is sufficiently low. Conversely, an unbalanced, end-fed, or single-wire antenna is most likely to accentuate r-f voltages floating around the shack.

A wide copper strap from the rig to a pipe driven deeply into the earth is helpful in eliminating such r-f feedback, but is seldom a complete solution. The very height of most high-powered transmitters is sufficient for part of a standing wave to develop on the rack itself. Therefore, get the r.f. out of the shack.

The Importance Of Bias

All stages following the keyed stages should be operated with sufficient fixed bias to reduce key-up plate current to a safe value.* However, all benefits of shaping the keying pulses can be nullified by passing the keyed signal through a single stage that is fixed biased far beyond cut-off. Such a stage does not deliver any output until the r-f excitation voltage is sufficient to overcome the fixed bias, when it starts emitting power " all of a thudin'." Using just enough fixed bias to cut off plate current (or slightly less than this amount) will eliminate this trouble. Additional operating bias may be obtained with grid-leak bias.

Another advantage of operating a stage with a minimum of fixed bias is that it will usually (but not always) reveal any self-oscillation and parasitics. If it is necessary to bias any stage beyond cut-off in order to stabilize it, you can be sure there is something wrong which should be corrected before going any further.

Cleaning Out The Parasitics

The failure to eliminate *all* parasitics and instability in a transmitter is probably responsible for more TVI, bad notes, key clicks, and chirps than any other single item.[29, 30, 31, 32]

It must be stressed that because a stage is stable with the key up or down does not necessarily mean that it is clean the moment the key is pressed and released. At these times, the tube goes through a transient period of higher-than-normal transconductance, and a parasitic oscillation can start. The parasitic may be snuffed out in a few microseconds as the excitation builds up to a maximum or drops off to zero, but while it lasts, it can wreak havoc in every TV set in the neighborhood and in the Ham bands as well. These transients are peculiar animals, and they must be treated carefully. See the references for more details.

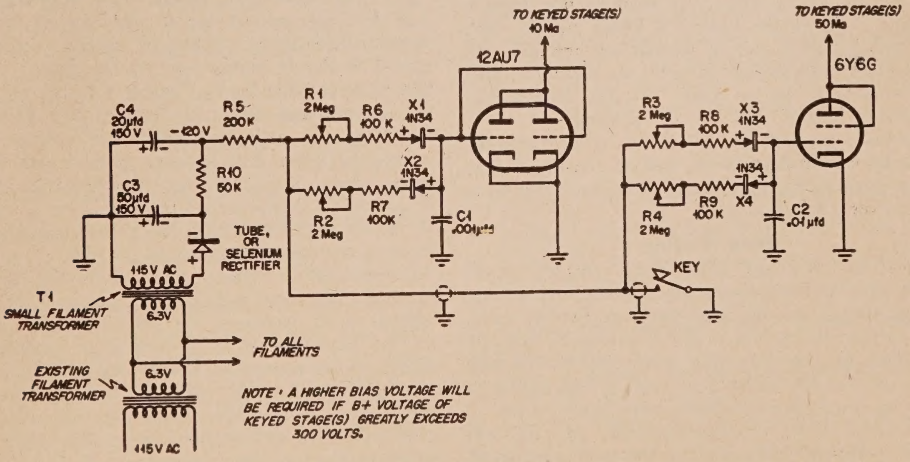
Complete neutralization, especially of pentodes (and pentodes that *theoretically* do not require it) is also important in obtaining high transmitter stability. Avoid having r-f chokes in the grid and plate circuits of the same stage if possible.[32]

Voltage regulator tubes should be watched, too. They can act as relaxation oscillators in the 100-300 kc. region and modulate the transmitted signal. They can sometimes provide regenerative coupling between stages thereby producing mysterious oscillations.

A fair-sized bypass condenser (not more than 0.5 μfd. paper, in parallel with 0.005 μfd. mica) across each V-R tube will usually tame them. Do not use more capacity than necessary, as this invites more oscillation trouble.

Keying Methods

So far, we have covered good engineering that should be used in any transmitter. Only after we have a stable oscillator, well isolated from the rest of the transmitter, have eliminated stray r.f. from floating around the shack, have the bias voltages correct, and, above all, are sure there are no para-



NOTE: A HIGHER BIAS VOLTAGE WILL BE REQUIRED IF B+ VOLTAGE OF KEYED STAGE(S) GREATLY EXCEEDS 300 VOLTS.

C1—0.001 μfd. (see text)
C2—0.01 μfd. (see text)
C3, C4—20 to 50 μfd., 150w.v.
R1, R2, R3, R4—2 megohm potentiometer
R5—200,000 ohms 1w.
R6, R7, R8, R9—100,000 ohms, ½w.
R10—50,000 ohms, 1w.
T1—115v. to 6.3.v filament transformer connected in reverse
X1, X2, X3, X4—1N34 crystal diodes or equivalent.

Fig. 2. A two-stage vacuum tube keyer. The shaping of the keyed characters is started in the first tube and completed in the second. This arrangement is particularly valuable when keying an oscillator during break-in operation, where introducing enough lag in the keying circuit to eliminate clicks only produces chirps.

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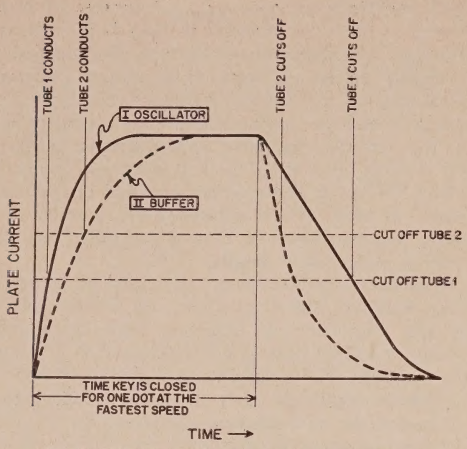
* Clamp-tube protection of screen-grid tubes is also good, but requires power, because either the screen grid or the control tube is always drawing current. The resulting heat is fine on a cold morning, but might as well be from a bias supply.—**Tech. Editor**



NOTE: THERE IS NO TRANSMITTER OUTPUT UNLESS BOTH CURVES ARE ABOVE PLATE CURRENT CUTOFF LINES.

Fig. 3. This is how the circuit shown in Fig. 2 shapes the keyed characters in steps. The oscillator reaches maximum output almost instantaneously after the key is pressed with the second stage reaching maimum output more gradually. When the key is released the opposite effect occurs. The oscillator "hangs on" momentarily, but the second stage will cut off very rapidly. The net result is sufficient delay on both "make" and "break" to eliminate clicks, without producing chirpy, soft keying.

sitics any place in the transmitter, should we worry about click elimination.

The most generally satisfactory method of shaping keying is by means of vacuum-tube keyers. *Figure 1* shows the basic v-t keyer circuit, with the addition of a pair of germanium crystals. By permitting current flow in only one direction, they add versatility to the keyer through independent control of "make" and "break" shaping.

Almost any low-mu triode or triode-connected pentode or tetrode may be used as the keyer tube for a low-current stage such as an oscillator or a low-power exciter stage.

Step Keying

Since the tube and other components for a v-t keyer are relatively inexpensive when keying low-power stages, we might as well use two of them, one to key the oscillator and a second to key one or more of the following stages.[18, 21] In this way, part of the shaping is done in the oscillator and the rest is done in the second keyed stage.

Figure 2 shows a practical circuit. *R1*, *R2*, and *C1* are adjusted first with only the oscillator turned on. *R1* is adjusted for a very short time constant, so that the oscillator goes on almost instantaneously. *R2*, however, is adjusted to produce a distinct tail on the "break." The more stable the oscillator, the more lag that can be used, especially on the "make", without trouble.

R3, *R4*, and *C2* are adjusted with both stages in operation. *R3* is adjusted for a longer lag on the "make" than that produced by *R1/C1*. However, the time constant of *R4/C2* is somewhat less than that of *R2/C1*. With these adjustments, the oscillator comes on almost instantaneously when the key is pressed, and shaping is done in the second stage. When the key is released, just the opposite occurs. The oscillator hangs on a trifle to permit "break" shaping in the second keyer.

Figure 3 shows graphically the action of the two-stage keyer. Note that there is no transmitter output until both curves are above their respective dotted lines. The curves show clearly that the oscillator is on appreciably longer than the following stage.

The values shown in the figures are intended merely as starting points. There are so many variables that it is impossible to do more. The best way to get the desired results is to diddle the controls and try different capacities for *C1* and *C2* until you are satisfied.

The function of *R5* is to prevent short-circuiting the bias supply when the key is pressed. Its value has no effect on the "make" time constants, but it does affect the "break" constants.

Obtaining the keyer tube bias as shown is convenient and works well. It does require plenty of filter, however, to eliminate possible hum modulation of the carrier. Do not attempt to use a transformerless supply here or elsewhere in the transmitter; that is, do not tie one side of the a-c power line to the chassis. Aside from the shock hazard, doing so can put ripple modulation on your signal. It could also result in a burned out antenna coil or other components in your receiver, should the antenna become grounded.

Precautions In Using V.T. Keyers

A few precautions are in order when using a vacuum-tube keyer. First, it should always be placed in the B minus lead, rather than the centertap or cathode lead. *Figures 4A* and *4B* show the correct and incorrect connections. With the keyer in the cathode circuit, the voltage drop across the keyer tube appears as grid bias on the keyed stage. This can upset the operation of the stage, unless compensated for.*

Do not forget to install the bypass condenser as close to the socket terminal as possible.

Even with zero bias on the keyer tubes, there is a certain minimum voltage drop across them. This voltage drop decreases the effective plate voltage on the keyed stage(s) by the same amount. A 6Y6G, triode-connected, has a voltage drop of approximately fifty volts when passing a current of fifty milliamperes under these circumstances. And a 12AU7, with both sections in parallel, has a drop of thirty-five volts at a current of ten milliamperes.

The reduction in effective plate voltage is seldom important in a low-level stage; however, if it should be, the voltage drop across the keyer tubes may be decreased by paralleling tubes.

---

* Equally important, cathode keying is actually a combinaton of grid and plate keying. It is usually more difficult to find proper values for the lag circuits with it than with straight plate-circuit (B-) keying.
—Tech. Editor

Remember that the key is in a high-impedance circuit. In general, treat it as if it were a crystal microphone and the keyer tube grids as if they were the input circuits of high-gain speech amplifiers. This means shielded key leads and short, shielded leads in the grid circuits. Sixty-cycle hum pickup in these circuits will modulate the emitted signal for a T8 (DX scale) note. R.f in them is a sure way to invite "incurable" troubles. An r-f filter at the key terminals or right at the grids may be necessary under especially difficult conditions, but is seldom necessary.

Noise In The Receiver

In a well-designed transmitter, key-up noise in the receiver is seldom much of a problem; however, a few notes on the subject are apropos.

Rectifier hash is the biggest offender. I have been trying for seventeen years without complete success to find a sure-fire cure, therefore I would welcome suggestions myself. The following methods are at least helpful:

With choke-input power supplies, hash is minimized by having minimum bleeder current equal to the critical value determined by the inductance of the input choke.33 In a power supply with a skimpy bleeder, allowing the r-f tubes to draw some plate current with the key up may reduce rectifier hash. With condenser-input filters, popular even with mercury-vapor rectifiers as a voltage raiser, there is really no solution to the hash problem because a noise pulse is generated every half cycle of the power-line frequency.

Hash filters in the rectifier plate leads help, but only slightly, because the leads are necessarily long and reduce their effectiveness. 872's are slightly better than 866's, because they are somewhat better shielded, and their higher peak-current capability is useful, especially in condenser-input power supplies.

Double-shielded power transformers are excellent for reducing hash, but who can afford them?

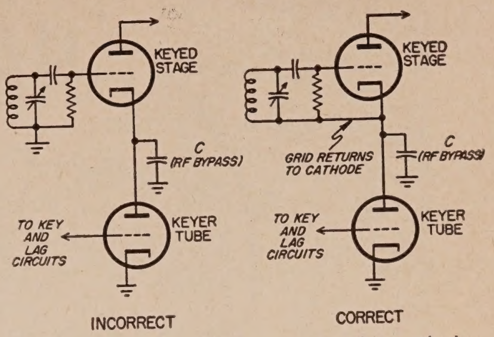


Fig. 4. This illustrates the recommended method of connecting a vacuum tube keyer. When connected as in left-hand drawing, the minimum voltage drop across the keyer tube (35 to 100 volts) appears as bias on the keyed tube. This additional bias may completely upset an otherwise stable stage. The circuit connection at the right avoids this difficulty.

Bridge rectification is slightly better than conventional full-wave or half-wave rectification from the standpoint of reduced hash generation. It has the additional advantage of a better transformer-utilization factor than with full-wave, centertap rectification. (1.11 to 1.34 ratio of transformer volt-amperes to d-c output power.)

When trying to copy an extremely weak signal, when even a small amount of hash is objectionable, a sure cure is always available. Just shut off the transmitter h-v primary power during reception periods.

Conclusions

If anyone doubts that following these principles will not permit clean, chirpless, clickless, break-in operation with a high-power c-w transmitter, I invite a critical examination of the signal from W6MUR on all major CW bands.

Keying
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7. "Crystal Oscillator Keying," **QST**, March, 1936, p. 34.
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12. Burnett, "Clean-Cut Break-In Keying," **QST**, Mar., 1947, p. 27.
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14. Carter, "Reducing Key Clicks," **QST**, March, 1949, p. 30.
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25. Black, "The T9'er," **CQ**, April, 1948, p. 17.
26. Wherry, "Modern Heterodyne Exciter," **CQ**, July, 1952, p. 13.
27. Shapiro, "Heterodyne VFO," **CQ**, Dec., 1950, p. 16.
28. Mitchell, "Easy-way Heterodyne," **CQ**, March, 1953, p. 21.

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29. Hansen, "Parasitics and Interference," **QST**, June, 1936, p. 40.
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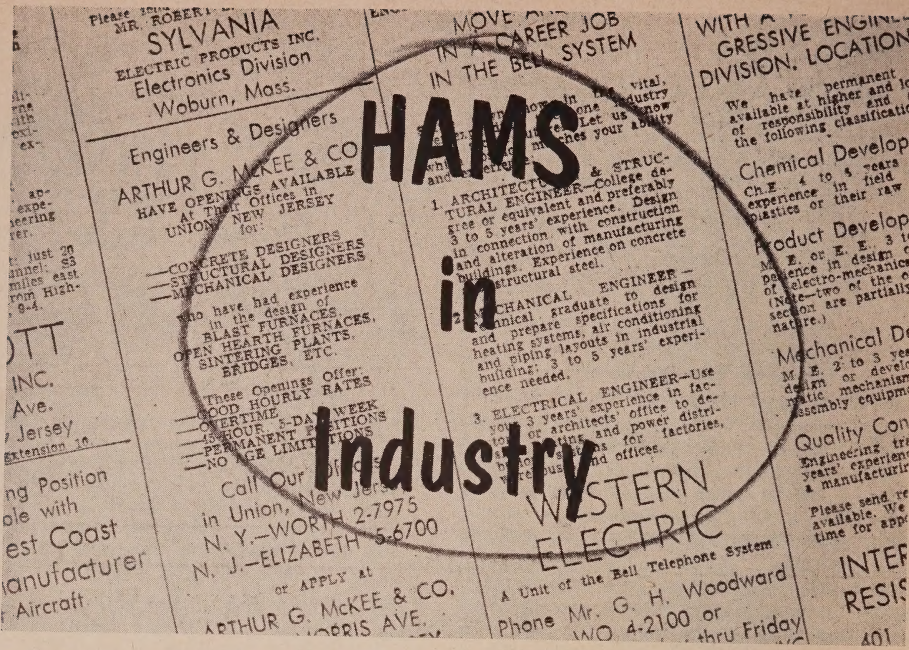
31. Goodman, "No Neutralization Required," **QST**, June, 1946, p. 48.
32. "Pursuit and Elimination of Parasitics," Orr, **CQ**, Dec., 1950, p. 24.
33. "Choke-input Filters," power supply chapter, **Radio Amateur's Handbook.**



HAMS in Industry

JAMES N. WHITAKER, W6KRZ

Hughes Research And Development Laboratories,
Culver City, Calif.

Occasionally, it is helpful to recall that amateur radio is more than a hobby. This brief report, by W6KRZ, of radio amateurs at the Hughes Aircraft Company is an excellent picture of the relationship between amateurs and progressive companies throughout the country—Editors.

In the public mind, the word *amateur,* in contrast to the word *professional,* usually means someone dabbling with a hobby he knows little about. In some fields, this belief has considerable basis in fact; however, it seldom applies to the licensed radio amateur. His contributions to the radio art make it unnecessary to dwell upon the point.

Many radio amateurs have used their hobby as a stepping stone to a career in radio or electronics. Conversely, many technicians and engineers turn to amateur radio for stimulating recreation.

As we Hams know, our fraternity is very firmly knit. The most famous amateur is always willing to assist the newest beginner. And the beginner is never afraid to ask questions of the "old timer." He, in turn, passes the information on to those who follow in his footsteps. As a result, every amateur is simultaneously an enthusiastic teacher and an eager student.

Amateur experience in designing, building, and operating high-frequency, receiving and transmitting equipment gives one a knowledge of more than the mere fundamentals of the art. In addition, one also acquires mechanical skill as well. These facts are recognized by companies engaged in the development or manufacture of radio, electronic, and kindred equipment. They view a history of amateur radio activity on an employment application with considerable interest.

At the Research And Development Laboratories in the *Hughes Aircraft Company,* for example, an incomplete check of the employment roster reveals the names and calls of over 125 amateurs, ranging from technicians to research scientists.

In addition to their normal duties with the company, many of these amateurs are active in Civilian Defense and CAP communications nets. In fact, the headquarters of the Lennox Net, Disaster Communications Service, Los Angeles County Sheriff's Office, and of Squadron 11 of the CAP are located in the plant.

Regular drills are held semi-weekly, and additional drills are coordinated with air-raid warning drills held at the plant and by the community.

The author, having been placed in charge of the Communications Squadron, under Mr. Howard Allen, Civil Defense Supervisor for the Hughes Aircraft Company, has, therefore, a comprehensive view of defense group activities. Efforts are made to make each communications' drill serve a useful purpose in addition to its training value. A recent one consisted of dispatching mobile units to each of the Culver City fire stations to obtain the names and addresses of the officers in charge of each and where to locate them if necessary for the Com-

K2AS/6 (ex W8JH)	C. E. Leedy
K6AI	Rufus P. Turner
K6BO	Wm. F. Daley
K6DU	M. E. Hiehle
K6EO	N. I. Hall
W1GBN/6	Ralph A. Fannon
W1RBM/6	F. A. Buckley
W2IQY/6	Joe Fusco
W2SO/6	Mike Hiekle
W2SZX/6	Richard Johnson
W3GRA/6	I. Zipper
W4LPT/6	James Sarno
W4SBP/6	Ralph A. Fannon
W6AEP	R. F. Davis
W6AJJ	G. L. Riggs
W6AVH	Richard A. Keppel
W6BHH	Ray S. Thomas
W6BHQ	C. W. Ball
W6BMM	William R. Shoots
W6CDZ	Chester E. Lipman
W6DCN	Merle E. Ryland
W6DGX	William E. Caldwell
W6DJZ	Jack Harwood
W6DKM	D. J. Stuart
W6DMB	E. V. Schwartz
W6DVE	R. R. Bennett
W6ETU	Harry Pasquaye
W6EYN	Herbert T. Brown, Jr.
W6FAT	Paul Williams
W6FTS	Howard Forman
W6FZ	John A. Grutzius
W6GLP	G. O. Hayman
W6GNK	Rudolph P. Fannon
W6GZJ	W. E. Mathews
W6HX	F. M. Gillett
W6IBA	Don Sloan
W6IBI	Russell B. Burnett
W6IHY	Al Clark
W6IKJ	Ed L. Justice
W6IMQ	John Larson
W6IQG	Hal Hood
W6IUX	Delmar Rutan
W6IZJ	E. V. Phillips
W6JQI	R. C. Rollins
W6JZD	Al Engman
W6KHC	Fred W. Tann
W6KIC	Wilmont L. Hunter
W6KLZ	Glenn A. Mann
W6KNE	G. W. Legel
W6KPC	A. J. F. Clement
W6KR	Emile Begue
W6KRZ (ex W2BFB)	James N. Whitaker
W6KSD	Alexander Szerlip
W6KSO	Lew Miller
W6KXZ	Walter MacLean
W6LDB	Robert C. Petzel
W6LIU	Robert Woltz
W6LYA	Robert G. Hester
W6LZS	John A. Oliver
W6MAN	F. E. Nagel
W6MAQ	J. S. Bechdolt
W6MBF	Roland M. Allen
W6MXN	J. J. Deenean
W6NVM	J. O. Zachar
W6OFY	J. M. Willis
W6OQC	Harold Stephenson
W6OSU	Richard Reimer
W6PAL	Orrin A Walker
W6PCP	Edward F. Munsell
W6PE	Frank Smiley
W6PER	Clyde Warne
W6PHR	D. W. Wilson
W6PIF	Thomas J. Cunningham
W6QQJ	Rex Frields
W6QWL	John S. Lewis
WN6QZI	Louis Stary
W6RKU	E. V. Dill
W6RNQ	Ronald J. Forrestal
WN6RPQ	T. M. Powell
W6RYY	George Porter
W6SUD	Leigh Karaki
W6TEV	C. S. Knowlton
W6TIP	George Yucht
W6TYP	Art Child
W6UJG	Geo. H. Rodgers
W6UMD	Joseph Eugene Baker
W6UOR	E. King Frey
W6USB	M. K. Fisher
W6UXB	Mike Pellock
W6UYP	R. A. Williams
W6UYW	Peter C. Kreager
W6VCA	C. B. Williams
W6VDJ	John C. Bailey
W6VED	Wm. F. McAllister
W6VHM	Charles C. Olsefsky
W6VIC	S. B. Luftig
W6VJV	Albert F. Granger
W6VMI	U. E. Beebe
W6WHX	Robt. A. Moser
W6WQD	Robert J. Allen
W6WTU	Hugh E. Wells
W6WWI	Earle Davis
W6WXC	Orion Myrup
W6WXF	Harold F. Lockwood
W6YDZ	John Dallons
W6YHP	Barton Warren
W6YHR	Stanley R. Pierce
W6YJR	A. L. Galegos
W6YPU	Clive Couper
W6YTA	C. W. Reedy
W6YWR	J. A. Aseltine
W6ZHL	David E. Koontz
W6ZVM	Edwin Fine
W6ZXI	Reginald Thatcher
W7DEJ/6	Eleanor M. Palmer
W7LWY/6	D. E. Beecher
W7OXC/6	E. H. Babcock
W8HJW/6	Dossie B. Haas
W9BMI/6	Robert W. Sackett
W9JXP/6	Hubert A. Myers
W9OGS/6	William Bentley
W9OME/6	Jack L. Pomeroy
W9TJR/6	Richard Mannheimer
W9YTF/6	Don Jamison
W0YEE/6	Ralph Jacobson

A roster of Hams employed by the Hughes Aircraft Company.

munications Center. This would be information of great value in an actual emergency, when it might be impossible to reach them by normal means.

The value of the amateur-operated communications squadron was demonstrated recently when heavy rains in the area were fast developing a first-class flood threat. As soon as the seriousness of the threat became apparent, mobile units were dispatched to danger points. Often axle deep in water, they reported conditions every ten minutes to the Communications Center, until the rains stopped and the danger of the floods had abated.

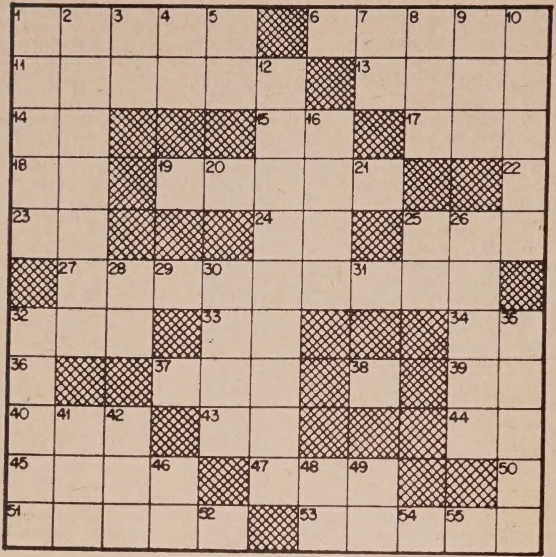
Mr. Allen commented, "The mobile operators provided ample information to help management make necessary decisions . . . The reports coming in every ten minutes, or so, provided excellent coverage of the critical areas outside the plant . . . We know it (the Communications Squadron) would do vital work during any major disaster."

HAC may well be proud of their Hams, and the Hams are proud of the recognition their company gives them and their talents.

A representative group of the CD communications unit at the research and development laboratories of the Hughes Aircraft Company, in front of some of the available mobiles. They are, standing, left to right: W6VHM, W6SUD, W6UYW, W6AVH, W6IZJ, W6UOR, W6UAU, W6VED, W6IQG, and W6ZVM. Front row: W6KLZ, W6DBM, W6KRZ, W6FAT, W6WHX, W6IHY, W6KXZ, and W6IUX.

So you think you know electronics?

Those who give up will find the solution on page 66.



DOWN

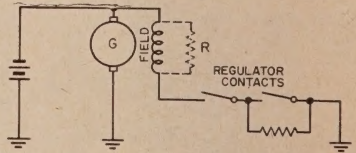
1. Electromagnetic Switch.
2. Radio "Ham."
3. Ham for "From."
4. Third Person Pronoun.
5. Opposite of Inside-Out. (Init.)
6. Designates Xformer in Schematic.
7. First Person Pronoun Plural.
8. ------The Breeze.
9. Abbreviation for Voltage.
10. Religious Groups.
12. Used to Mark Resistors (Two Words).
16. Ham Abbr. for Piezo-Electric Quartz.
19. Symbol for Electromotive Force.
20. Abbr. for State in 8th District.
21. Symbol for Unit of Current.
25. Prefix for Hungary.
26. Loafs.
28. Negative.
29. Symbol for Electrostatic Flux Density.
30. 90 Degrees from North.
31. Designates 8 Pin Socket.
32. 250 Watts.
35. State in 7th District.
37. Reactance Divided by D.C. Resistance.
38. Symbol for One Alternation.
41. Name of YL.
42. Ham for Chassis.
46. First Person Pronoun.
48. Prefix for Spain.
49. Prefi for Argentina.
52. Symbol for Ohmic Component.
54. Two Element Tube. (Init.)
55. Symbol for Current.

ACROSS

1. A Ham's Primary Avocation.
6. Diodes, Triodes, Tetrodes, etc.
11. Antidote for Orally Taken Poison.
13. Identical.
14. Prefix for Norway.
15. Prefix for Greenland.
17. Ham for Messages Handled.
18. Preposition.
19. Italian Inventor.
22. Shape of Dipole and Feed Line.
23. Biblical for You.
24. Prefix for Peru.
25. Possessive Pronoun.
27. Relay, Operating when Current Insufficient.
32. Signal Meaning "Increase Power."
33. Intensitive Force Regularly Changing Direction. (Init.)
34. Prefix for Libya.
36. Higher than VHF is—HF.
37. Signal Meaning Contact.
38. Designates Component Causing Voltage Lag in A.C. Circuit.
39. Man's Name.
40. Mountain in "HB" Land.
43. Worth 6 Points in Football. (Init.)
44. Continent Below Ours. (Init.)
45. Wander.
49. Prefix for Argentina.
50. Designates Unit of Inductance.
51. Used to Resonate to Frequency.
53. Frequency detected by ear.

Inside the Shack and Workshop

Minimizing Regulator Interference



The elimination of voltage regulator interference in mobile operation has proven to be quite a problem. The installation of a 50 or 100-ohm 1-watt non-inductive carbon resistor directly across the field winding as shown has proved very effective in several cases. The energy stored in the inductance of the field winding is quickly drained off through the resistance when the regulator contacts are opened, consequently no sparking is produced at the contacts with resultant interference. The addition of this resistance has not affected the operation of the regulators or generators to which this modification has been made.

Bob Perthel, W9MWD

NOVICE SHACK

Conducted by HERB BRIER, W9EGQ

385 Johnson St., Gary 3, Indiana

The 21.1 to 21.25-Mc Novice band offers greater opportunities for working foreign DX than either of the lower-frequency Novice bands. This was dramatized by the reports in the July *Novice Shack* of KN2CHS working five countries on four continents within a few days, while running fifty watts input, and using a 7-Mc. folded dipole.

Other Novices should be able to do similar work on 21 Mc., but only if they understand and take advantage of the possibilities and limitations of the band. Successful 21-Mc. work requires just a little bit more from both the operator and the equipment than do the lower frequencies.

Getting the Most Out of the 21-Mc. Band

We all know that the ability to communicate over long distances on the high-frequency amateur bands varies not only with the time of the day and the season of the year, but also with the eleven-year sun-spot cycle.[1] When the average sun-spot activity is high, frequencies far above 30 Mc. will support long-distance radio communications during the daylight hours. When it is low, as it will continue to be for the next few years, the maximum usable frequency (MUF) for DX work will seldom go much above 21 Mc. When it does, great distances can be spanned on the 21-Mc band with low-power equipment—if stations are on the band in the right places.

Conditions on 21 Mc. will be relatively good for the next few months. They will then taper off during the middle of the Winter, improve again next Spring, and go into another decline next Summer. This makes the present period a good time to try out the band. Even during the more favorable months, the band will not be open every day. As a result, you could spend a lot of time on it with nothing to show for it, unless you take advantage of every possible method of knowing when the band will be open. The first of these is W2PAJ's monthly *Propagation Forecasts* in *CQ*.

These forecasts predict with a rather high degree of accuracy the best time of the day for attempting to communicate with various DX areas from the United States with the added information of what percentage of the times predicted that the path will actually be open.

This month's forecast will probably indicate that the 21-Mc band should be open between most sections of the United States and Central and South America practically all day as often as two days out of three. Stations in the eastern half of the United States will have up to one chance in four of finding the band open for an hour or so into some part of Europe, while the chances of working Europe from the west coast will probably be practically zero. On the other hand, conditions into the Far East will be just about the reverse. Similar information will apply to many other paths.

In addition to the other information in the *Propagation Forecasts*, there is a box containing last-minute information when propagation conditions are expected to be above or below normal. These predictions are very important, because conditions must be at least normal before much can be expected on 21 Mc. They have been about sixty-five per cent accurate.

Using WWV

WWV, the National Bureau of Standards station, which transmits standard frequencies, time signals, and other information continuously on 2.5, 5, 10, 15, 20, and 25 Mc., also offers a valuable propagation forecasting service. At 19½ minutes after and 10½ minutes before each hour, WWV transmits prop-

Tom Hamel, 16, who was waiting for his General Class license when this picture was taken, and his attractive station W9WJI, Chicago. The rack to the left must be for future expansion, because his rig is a 6AG7-6L6, with 30 watts input.

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[1] See "DX And The Sun," by George Jacobs, W2PAJ, CQ, July and August, 1953, also W2PAJ's monthly Propagation Forecasts in CQ.

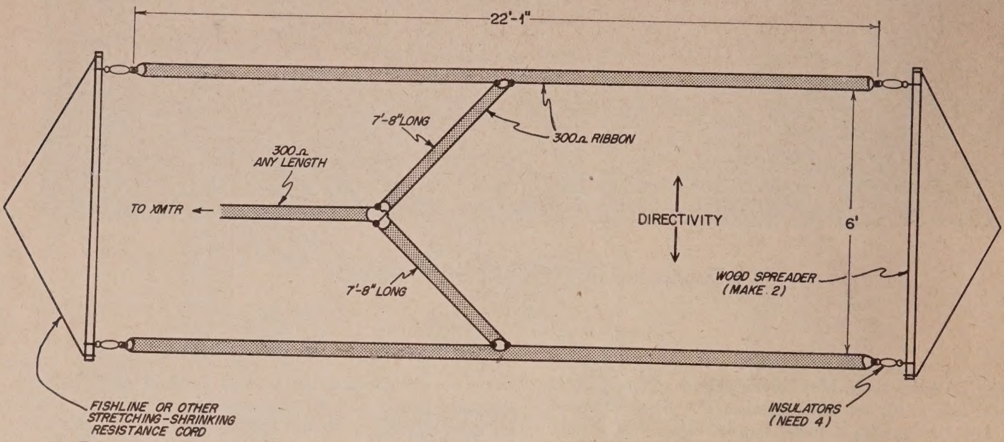


Fig. 1. Simple, twin folded-dipole bi-directional array for the 21-Mc. Novice band. Gain approximately 4 db. Antennas should be parallel with the earth. The two wires at the ends of each dipole are bared, twisted together and soldered before being fastened to the insulators, which should have a long leakage path for lowest losses in wet weather. One side of each dipole is opened in the center to accommodate the 7 foot 8 inch matching sections. Note that one stub is given a half twist before being connected to the main feed line. Allow the matching stubs and a few feet of the feed line to drop vertically from the array before bringing line to transmitter.

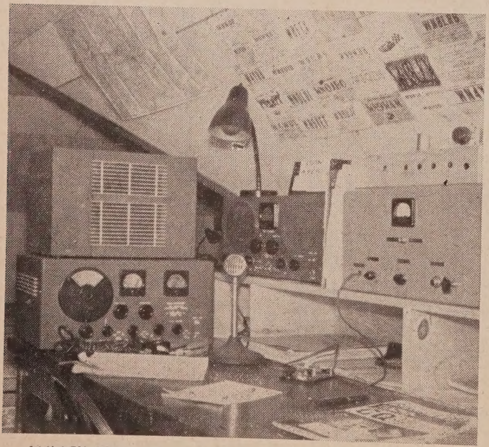
agation forecasts for the next twelve hours.

They are sent in the International Morse code and take the form of the letter "W," "U," or "N," followed by a number from 1 to 9.

"W" indicates that conditions are expected to be below normal. "U" indicates unsettled, and "N", normal. The number then estimates how good or bad the conditions are expected to be. "W1" means extremely poor, "useless," and "N9", extremely good.

A report of "N6" is about the minimum under which much can be expected of the 21-Mc band. "N7" or better warrants watching it closely. These reports refer specifically to the North Atlantic paths into Europe, but are usually a good guide to conditions to be expected throughout the United States.

The nice thing about these forecasts of WWV is that you can listen the night before and learn whether 21 Mc. is likely to be open the next day.



WNØMRQ, Don Ayers, Mexico, Missouri, is the address of this station. Twenty-two states were worked in four months on 3.7 and 7.2 Mc. with a 6L6. Don is a Boy Scout and would like to hear from other scouts who are Hams.

You might wonder why it would not be a lot easier to just listen to the 21-Mc band to find out if it is open. Obviously, if you listen to the band and find it full of loud signals, that is proof positive that the band is open. However, the absence of signals does not necessarily mean that the band is dead. It may mean that there are no signals on the air in the proper places or that they are just listening, as you are. A CQ under these circumstances sometimes brings forth several replies.

An odd thing about the 21-Mc band worth mentioning is that it will often be open for DX work, when work with other stations within the United States is impossible. An exception to this is during periods of "sporadic-E" or "short-skip" conditions, when distances of around 650 miles can be covered with strong signals. This unpredictable type of communication occurs most often in the summer months, and its frequency of occurrence will decrease as the fall progresses.

Equipment For 21 Mc.

Transmitters: Single-tube transmitters either will not work at all on 21 Mc., or their output is too low for satisfactory results. Two-tube transmitters using an untuned oscillator followed by an amplifier are better, but they, too, work at reduced efficiency at 21 Mc, because a 7-Mc crystal must be used[2] and the amplifier operated as a frequency tripler. A tripler operates with a tube efficiency of about forty per cent, compared to an efficiency of about seventy-five per cent for a straight amplifier.

Besides the reduced output from a frequency multiplier, one used in the output stage of a transmitter is more likely than a straight amplifier to produce

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2. Crystals for frequencies higher than about 8 Mc. are "overtone" oscillators; that is, they are actually carefully-ground lower-frequency crystals that will oscillate at approximately an odd harmonic of their fundamental frequency in oscillator circuits designed for them. In an oscillator such as the Pierce, they oscillate at their fundamental frequency.

A NEW MOBILE RECEIVER CONCEPT

GONSET
SUPER-CEIVER

Super-ceiver, a new Gonset development, offers you mobile receiver performance equal to that of a high-quality, fixed station communications receiver.

The Super-ceiver combination consists of three elements: HF tuning head, which may be a Super-Six or other standard, good quality converter, a control box and the all-important Model 3041 unit, the heart of the combination. The latter is actually a crystal controlled, superheterodyne receiver with input circuits fixed-tuned to the output frequency used for the average converter. (1430 kc for Super Six) When preceded by a converter, this input constitutes the first I.F. of a dual-conversion receiver and the high frequency used insures adequate image rejection. The second conversion to 265 kcs. provides a new high order of mobile receiver phone selectivity. Four, double tuned I.F. transformers provide highly desirable steep-shoulder and restricted band-pass selectivity characteristics. A highly stable voltage regulated BFO with adjustable pitch control permits CW or SSB reception. Manual AF and RF gain controls, (and AVC) provide optimum, wide-range adjustment for strong or weak signals. The well-known Gonset noise clipper effectively copes with ignition interference. Between carrier, background noise suppression, (squelch) brings this new amateur unit into line with long established commercial practice. A well-filtered, vibrator power supply, (built in) also furnishes regulated voltage for the associated HF converter. This same supply may be used with either 6 or 12 volt inputs! PM speaker is mounted on the Model 3041 panel. A highly compact control head mounts RF and AF gain controls, also BFO and MUTING on-off switches. Four foot cables with connectors are supplied for easy interconnection of all three elements. Here in brief, is a description of the Gonset Super-ceiver combination, a new mobile receiver concept.

Six band operation, (10-11-15-20-40-75) when used with "Super Six".

"Finger-tip control" wth remote control head 2" high to match Super-Six converter.

COMPACT! Model 3041 unit is 6⅞" wide, 6¾" deep and 5¼" high. Control head is 5" wide, 3½" deep, 2" high.

Price includes tubes and 1430 kc crystal for Super Six input. (Crystal may be factory exchanged for 1525 or 1550 kc inputs at no charge if sent in with the warranty registration card supplied with each equipment.)

$119.50

INCLUDING FEDERAL EXCISE TAX.

(Price does not include Super Six converter.)

SEE IT AT YOUR DEALER

GONSET CO.
801 SOUTH MAIN ST.
BURBANK, CALIF.

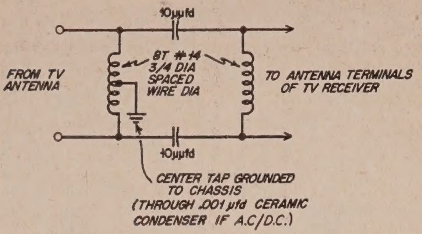

10μμfd
8T #14
3/4 DIA
SPACED
WIRE DIA
FROM TV ANTENNA
TO ANTENNA TERMINALS OF TV RECEIVER
10μμfd
CENTER TAP GROUNDED TO CHASSIS (THROUGH .001 μfd CERAMIC CONDENSER IF A.C/D.C.)

Fig. 2 Simple, 300-ohm high-pass filter, designed to be inserted between feed line and antenna terminals of TV receiver, preferably right at tuner. Its effectiveness is sometimes improved by varying spacing between turns in coils.

harmonic radiations that might fall into a local TV channel, producing repercussions that require no elaboration.

The most desirable two-tube transmitter for 21 Mc. is the one using a harmonic-type tuned crystal oscillator, followed by an amplifier.[3] A 7-Mc crystal is used, with the oscillator plate circuit tuned to 21 Mc. The output stage thus operates as a straight amplifier.

Crystal frequencies between 7034 kc. and 7083 kc. will triple into the 21-Mc Novice band. 21-Mc coils will have approximately one-third the number of turns as 7-Mc coils, with the diameter and winding length remaining the same. They may be wound with slightly heavier wire.

A calibrated wavemeter, such as the *Bud* "Gimmix," reviewed in the May, 1953, *Novice Shack* is very helpful in tuning up. It makes it easy to be sure that the transmitter is actually tuned to 21 Mc., and not to either 14 or 28 Mc.—much easier to do than sometimes suspected.

Antennas: Practically all 7-Mc. antennas will operate as third-harmonic radiators on 21 Mc. Most 3-7-Mc. antennas will also work well, except folded dipoles and those fed in the center with fifty to 100-ohm, solid-dielectric feed lines. A ½-wave antenna for the center of the 21-Mc Novice band is 21 feet 1 inch long and may be fed with any of the conventional feed lines.

A rotary beam is probably the ideal 21-Mc antenna for many amateurs. There is not room enough to discuss them here, but either the *ARRL* or *Radio Handbooks* will give essential details for building one. Sketched in *Fig. 1*, however, is a simple fixed beam that you may care to try. Compared to a ½-wave antenna at the same height, it will approximately double the effective power of a transmitter connected to it. It does not compare in effectiveness with more elaborate arrays, but it is hard to beat for simplicity.

Receivers: All commercial communications receivers tune to the 21-Mc band. Most *surplus* ones do not; therefore a simple converter is required with them.[4]

TVI

Those who work the 21-Mc band are aware, much to their chagrin, that it has the reputation of being particularly prone to cause television interference. This is because up to a year or so ago, the standard television i-f channel started at 21 Mc. (It has now been changed to 42 Mc.) Any Ham signal getting into the i-f channel will cause interference to the receiver, no matter to which channel it is tuned.

The symptoms of this type of interference are similar to those from overloading of the receiver input circuits by a nearby transmitter; turning the band switch has little or no effect on it. The answer to the problem is always the same, a high-pass filter or trap at the receiver antenna terminals, preferably right at the tuner.

Figure 2 is the diagram of a simple high-pass filter. Although its attenuation is not as high as the more-elaborate commercial ones, it will usually greatly reduce i-f feed-through interference or front-end overload from any transmitter operating below 30 Mc.

Describing this filter does not mean that I advise installing them indiscriminately on all TV receivers that you are supposed to be interfering with. Servicing TV receivers is the job of TV servicemen. You might offer to connect one *temporarily* at the receiver antenna terminals to determine whether it will help; then recommend that the owner have his serviceman install one permanently right at the tuner.

Harmonic radiation is your responsibility. It is usually characterized by interference on only one or two channels. Channels 3 and 6, being the third and fourth harmonics of 21 Mc., are the ones most likely to be affected. The *Handbooks* discuss fully methods for locating the source of such radiations and how to eliminate them.

See you on 21 Mc.

Letters And General News

Mario, I1CWZ, Milan, Italy, leads off this month. He writes: "Dear Herb, As I have been Hamming for three

(Continued on page 65)

W8MEL, Cincinnati, and the proud owner, Jerry Mersch. Transmitter is a 6L6-807, with 75 watts input on 3.7 and 7.2 Mc. Receiver is a National NC-125. A 3.7-Mc folded dipole and a 7.2-Mc vertical ground-plane antenna are available.

---

[3] Example: "Foolproof Novice Transmitter," Kirchoff and Bulkley, CQ January, 1952.

[4] The one-tube converter described on page 119 of the 1953 edition of the ARRL Radio Amateur's Handbook will cover the 21 Mc band, if L2 is changed to ten turns, #20 wire, 1-inch diameter (B&W 3015). No other changes need be made.

25th ANNIVERSARY YEAR

HARVEY HAS THE MOST COMPLETE STOCK OF MOBILE GEAR

ELDICO TR-75-TV TRANSMITTER KIT

This is an ideal unit for the novice. Very simple to assemble. New, revised circuit to aid in the elimination of TVI. Uses 6L6 oscillator — 807 amplifier combination PI-network output. Husky power supply delivers 600 volts to the 807. Complete . . . including a punched chassis and shielded cabinet. Unbelievably low priced at . . . **$64.95**

MD-40 modulator kit for above...	**49.95**
MD-40P as above but with power supply.........	**59.95**

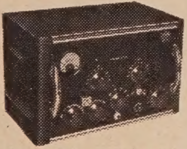
SUPERIOR POWERSTATS

Smooth, efficient voltage control, 0-135 volts output from 115 volt AC line. Models also for 230 volt input. Write for free literature. Models for table and panel mounting.

Type 10, 1,25 amps	**$ 8.50**
20, 3 amps	**12.50**
116, 7.5 amps, table mtg.	**23.00**
116U, 7.5 amps, panel mtg.	**18.00**
1126, 15 amps	**46.00**
1156, 45 amps	**118.00**

Complete Stock Always On Hand For Immediate Delivery

SONAR Model SRT-120 Transmitter



For mobile and fixed location operation. Has band-switch for 80, 75, 40, 20, 15, and 10 or 11 meters, plus spare position for any future band. Has provision for two crystals or external VFO head. Final amplifier employs the new Amperex 9903/5894A tube. Power input is 120 watts on CW, and 100 watts on phone. All circuits metered. Power requirements: 600 volts dc at 350 ma, and 6.3 volts at 6 A.

Complete with Tubes	**$198.50**
External VFO Head	**19.50**

SRT-120P same as SRT-120 but with built in push-to-talk relay and self-contained power supply for use with 110-125 v. 50-60 cycle line **$279.50**

Also available in Kit Form:
120 Kit—$158.50 120P Kit—$198.50

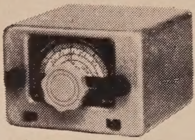
HARVEY carries a complete line of all makes and types of

FIXED and MOBILE ANTENNAS

NOTE: In view of the rapidly changing market conditions, all prices shown are subject to change without notice and are Net, F. O. B., New York City.

GONSET "SUPER 6"

Six Band Amateur Converter



A compact converter covering 10, 11, 15, 20, 40, and 75 meter phone bands. Also covers 6 mc. (49 meter) and 15 mc. (19 meter) short wave broadcast bands. Uses 6CB6 low noise rf stage, with panel controlled antenna trimmer, 6AT6 triode mixer, 6C4 modified Clapp oscillator, and 6BH6 IF stage.
Complete with Tubes **$52.50**

GONSET "COMMUNICATOR"

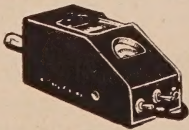
A complete two-way station for 2 meter band operation. Suitable for mobile or fixed location use. Receiver is a sensitive superheterodyne with built-in noise clipper circuit and 6BQ7 Cascode rf stage. Transmitter uses 2E26 in final 15 watts input. Employs 8 mc. crystals for stability, and has a range of over 100 miles. Operates on either 110 volts AC or 6 volts DC. Weight approx. 16 pounds.
Complete with Tubes (less crystal and microphone) **$209.50**

New Mobile Receiver GONSET SUPER-CEIVER

Uses any converter as a tuning head. Employs crystal-controlled first IF and dual conversion to 265 kc. Adjustable-pitch BFO; AF, RF and AVC controls; built-in noise clipper and squelch; built-in PM speaker. Furnished with convertible (dual) 6-12 volt pack and tubes.
less converter **$119.50**

MILLEN GRID DIP METER

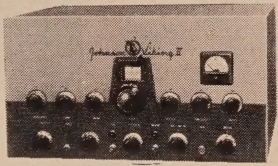
No. 90651



Covers 1.7 to 300 mc on seven direct-reading bands. Self-contained, compact. Plug it in to use with its own built-in transformer-type AC power supply. Or connect batteries to the handy internal terminal board **$61.50**

New Deluxe Transmitter Kit JOHNSON VIKING II

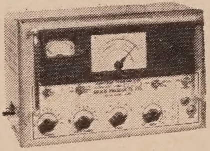
100 WATTS ON PHONE
130 WATTS ON CW



Every desirable feature has been included in this outstanding transmitter: BAND-SWITCHING to all amateur bands, from 160 through 10 meters . . . TVI suppression . . . 100% AM modulation . . . PARALLEL OUTPUT 6146 tubes . . . PUSH-PULL 807 MODULATORS. Supplied complete with pre-punched chassis, copper-plated steel cabinet, tubes, hardware, assembly instructions, and all necessary parts and components. **$279.50**

Viking II complete with tubes, wired and air tested	**324.50**
Viking VFO Kit, worthy companion to the Viking II	**42.75**
VFO Kit—wired and tested (with tubes)	**62.75**
Viking Mobile Kit, up to 60 Watts input for that rig-on-wheels	**99.50**
Viking Low Pass Filter, 4 section, 75 DB Att., handles a KW	**16.50**
Viking TVI Kit, everything to TVI-proof the Viking I	**24.75**

ELMAC A54



Under-dash Mobile Xmtr.

Measures: 7½" x 7½" x 12"
Weighs: 14½ lbs.

Covers 10, 20, 40 and 75 meter bands.

For Carbon Mike Input	**$143.00**
For Dynamic or Crystal Mike,	**153.00**
Power Supply, 110 volts AC,	**39.50**

'Off-the-Shelf' Delivery FOR YOUR SPECIAL NEEDS

SINGLE SIDEBAND EQUIPMENT
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TRANSISTORS, GERMANIUM DIODES, SUBMINIATURE TUBES CAMBRIDGE THERMIONIC COILS

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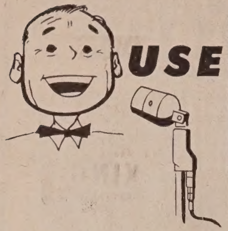
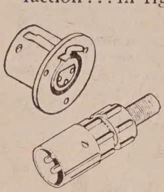
TO MAKE A GOOD RIG BETTER

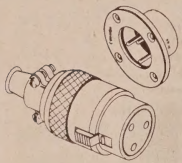


USE CANNON PLUGS

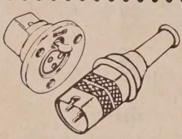
ABC, NBC, CBS and all radio and TV stations have used Cannon Plugs almost exclusively since they started . . . You can have the same high quality and dependability that spell satisfaction . . . in rig building *and* operation.



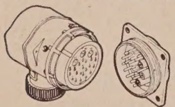
XL SERIES. With *thumb pressure* LATCHLOCK—no accidental disconnect. Mike and audio connector; 3 or 4 contacts, seventeen complete assemblies. Standard on top quality mikes. Available through most radio jobbers.



P SERIES. The old faithful—radio men swear *by* it, not *at* it. *Thumb pressure* LATCHLOCK, positive connection. Up to 8 contacts; steel plug shell. Ninety-nine complete assemblies for audio circuits and power.



UA SERIES. The RTMA specified standard, weatherproof; gold plated contacts, spring insert removal. *Thumb pressure* LATCHLOCK.



K SERIES. For power supplies, audio circuits and combined circuits. A great variety of shells and inserts.

In building a compact rig, look into the new "D" sub-miniatures 15, 25, 37, and 50—5a contact arrangements. They're *really* small. Likewise the "U" series—1-12 contacts. New XL Bulletin ready; also ask for RJC-6 with prices and list of our franchised distributors.

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NOT SO SILENT SWL

(from page 17)

the list. This couldn't be Roseanne because Roseanne has been mad at you since she caught you with Jeanette. I'll bet it's Jeanne! Come back and let me know if it's Jeanne."

When Jacque came back, there was a sound like a shot. I held my breath, fearful that Jacque might have met a hasty and untimely end; but then he modulated, and I knew the sound I heard was only a door slamming. He said sadly, "The YL, she was Suzy. She cannot talk now. She had to go very fast." Jacque didn't seem much up to the QSO after that, and we cut it short. I've heard since that he got off twenty and now does UHF work where his private life will be more of a local, rather than an international matter.

I tuned across the band again, more than a little troubled by SWLs in general.

"There's Pete!" the SWL said brightly. "He's got six toes and his wife makes him wear a toupee!"

A little further down the band we found a raspy voiced individual whom I had never heard before. The SWL knew him as Joe, a truck driver. "He once took a bath in scented milk on a bet," the boy informed me.

"And you've got all this in your book?" I asked.

"That's right."

"I'd like to own this book," I said. I pointed to a Hallicrafter's S-38 I had on a shelf as an emergency receiver. "Would you consider trading it to me for that?"

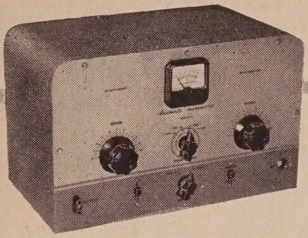
He rubbed his hand over the receiver. "Gee, you mean it!"

"I sure do!"

And so I got the book. Everything was there like he said. Things long forgotten confronted me again. The time I wired the plate voltage into the filaments. The day I ate a tamale for breakfast. The time I fell asleep in a roundtable. Nothing seemed sacred in the list that went on and on.

With a quick, nervous gesture I burned the book in the fireplace. Then I had a horrid thought. Had I extended the condition instead of rectifying it! Giving the SWL the S-38 meant he could listen more efficiently. What's to stop him from starting a new black book? A more thorough one?

But it didn't take me long to find an infallible solution. I've started working with that boy, and in a few months I'll have him ready for his exam. When he's a ham and gets his tongue loosened up, he'll never tell anything about his brother amateurs because, as everyone plainly knows, no ham dares tell what he knows about another—not when the other knows as much about him.



Heathkit AMATEUR TRANSMITTER KIT

Range	80-40-20-15-11-10 meters
6AG7	Oscillator - Multiplier
6L6	Amplifier - Doubler
5U4G	Rectifier

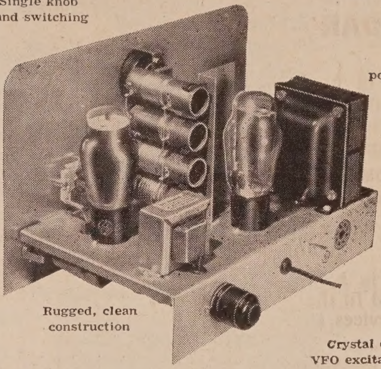
105-125 volts AC 50/60 cycles 100 watts

Size — 8⅛" high x 13⅛" wide x 7" deep

MODEL AT-1

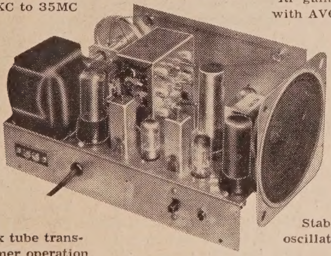
$29.50

SHIPPING WT. 16 LBS.


Pre-wound coils — metered operation
52 ohm coaxial output
Single knob band switching
Built-in power supply
Rugged, clean construction
Crystal or VFO excitation

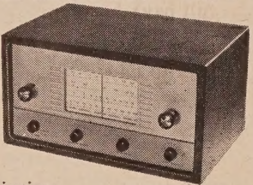
Here is the latest Heathkit addition to the Ham Radio field, the AT-1 Transmitter Kit incorporating many desirable design features at the lowest possible dollar-per-watts price. Panel mounted crystal socket, standby switch, key click filter, AC line filtering, good shielding, etc. VFO or crystal excitation-up to 35 watts input. Built-in power supply provides 425V @ 100MA. Amazingly low kit price includes all circuit components, tubes, cabinet, punched chassis and detailed construction manual. (Crystal not supplied.)

New HEATHKIT COMMUNICATIONS RECEIVER KIT


Four band operation 535KC to 35MC
Electrical band spread and scale
RF gain control with AVC or MVC
Six tube transformer operation
Noise limiter — standby switch
Stable BFO oscillator circuit
5½" PM speaker — headphone jack

Range	535KC to 35MC
12BE6	Mixer oscillator
12BA6	IF amplifier
12AV6	Detector - AVC - Audio
12BA6	BFO oscillator
12A6	Beam power output
5Y3GT	Rectifier

105-125 volts AC 50/60 cycles 45 watts



A *new* Heathkit AR-2 Communications Receiver. The ideal companion piece for the AT-1 Transmitter. Electrical band spread scale for tuning and logging convenience. High gain miniature tubes and IF transformers for high sensitivity and good signal to noise ratio. Construct your own Communications Receiver at a very substantial saving. Supplied with all tubes, punched and formed sheet metal parts, speaker, circuit components, and detailed step-by-step construction manual.

MODEL AR-2

$25.50

SHIP. WT. 12 LBS.

CABINET

Proxylin impregnated fabric covered plywood cabinet. Ship. wt. 5 lbs. No. 91-10. **$4.50**

THE IMPROVED *Heathkit* GRID DIP METER KIT

- **Pre-wound coil kit**
- **Range — 2MC to 250MC**
- **Meter sensitivity control**
- **Compact one hand operation**
- **Headphone monitoring jack**
- **Transformer operated**

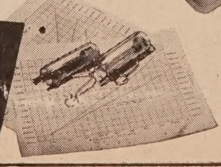
The invaluable instrument for all Hams. Numerous applications such as pre-tuning, neutralization, locating parasitics, correcting TVI, etc. Receiver applications include measuring C, L, and Q of components, determining RF circuit resonant frequencies, etc. Thumbwheel drive for convenient one hand operation. All plug-in coils are wound and calibrated (rack included). Headphone panel jack further extends usefulness to operation as an oscillating detector.

MODEL GD-1A

$19.50

SHIP. WT. 4 LBS.

HEATH COMPANY
BENTON HARBOR 6, MICHIGAN



Two additional plug-in coils are available and provide continuous extension of low frequency coverage down to 355KC. Dial correlation curves included. Shipping Wt. 1 lb. Kit 341. **$3.00**

to the

E.E. *or* PHYSICS GRADUATE

with an interest

or experience in

RADAR *or* ELECTRONICS

Here is what one of these positions offers you

Hughes Research and Development Laboratories, one of the nation's large electronic organizations, is now creating a number of new openings in an important phase of its operation.

OUR COMPANY

located in Southern California, is presently engaged in the development of advanced radar devices, electronic computers and guided missiles.

THESE NEW POSITIONS

are for men who will serve as technical advisors to the companies and government agencies purchasing Hughes equipment.

YOU WILL BE TRAINED

(at full pay) in our Laboratories for several months until you are thoroughly familiar with the equipment that you will later help the Services to understand and properly employ.

AFTER TRAINING

you may (1) remain with the Laboratories in Southern California in an instruction or administrative capacity, (2) become the Hughes representative at a company where our equipment is being installed, or (3) be the Hughes representative at a military base in this country—or overseas (single men only). Adequate traveling allowances are given, and married men keep their families with them at all times.

YOUR FUTURE

in the expanding electronics field will be enhanced by the all-around experience gained. As the employment of commercial electronic systems increases, you will find this training in the most advanced techniques extremely valuable.

How to apply

If you are under 35 years of age and have an E.E. or Physics degree and an interest or experience in radar or electronics,

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Assurance is required that the relocation of the applicant will not cause the disruption of an urgent military project.

AMATEUR TELETYPE

(from page 18)

CW men are finding that there is more and more room between the signals that yesterday seemed all jammed together. There *is* room for more stations. But what about RTTY signals—are they so much broader than CW signals? Let's take a look at this question.

Actually, the teletype code is more than three times as efficient as the Morse code in that it takes but five bands to convey all of the letters of the alphabet, numbers and punctuation. The Morse code requires a 17 unit code for the same amount of information. Then too, there is the speed of transmission. Teletype sends at 65 w.p.m. while most CW runs around 15-20 w.p.m. Three times as fast and three times as efficient, but does it take up nine times the bandwidth? Nonsense. The bandwidth is an interesting point though. It should be pointed out that our present standard of 850 cycles shift was enforced upon us against our collective will by the FCC. Much of the equipment that is being built by the amateurs today will operate well on narrower shifts, shifts as narrow as 85 cycles. The FCC has decreed however, that the minimum shift allowable is 800 cycles. So, for the present, we are stuck with it.

Deaf Ears

Writes one active RTTY'er, "You haven't ever mentioned the value of TT to the hard-of-hearing amateur. Am I to be cast out of Ham radio just because, for no reason that is my responsibility, I am losing my hearing? My hearing has been failing rapidly for the last few years and I turned to teletype in order to be able to stay on the air. Now I can watch the words as they come in and I have had more fun out of it than anything I have ever done in Ham radio before." There are several hard-of-hearing amateurs who have turned to RTTY to keep up their amateur activities. I'll leave it to your own imagination what a thrill it is to these fellows to be able to communicate with others.

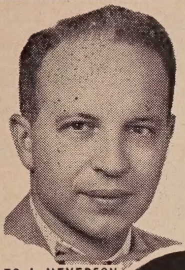
Tax

All this stuff is mainly talk though and I put it in just to have some fun and keep tempers short during this balmy fall season. Getting down to brassier (not brassiere) tacks, the primary raison d'etre for RTTY is to make some sort of feeble attempt to keep up with a technology that has largely passed the amateur by. If the amateur is to provide the military with even an inept pool of talent (theoretically a purpose of the Hams) he should have some sort of acquaintance with the stuff they use for communication these days: teletype. Then too, if my senile memory serves me right, deep in the antiquity of early Ham radio there was a brief history of Hams being experimenters, pushing at the limitations of the science. Now where are we? ". . . Well old man, the receiver here is a 75A2; the transmitter is a 32V3, with a Workshop beam . . . etc." This is the fellow who infests the phone bands with long chains of clichés about "rolling the old ball," "Arms of Morpheus," "modulating the mattress", ad nauseum.

With the exception of the SSB men and VHF enthusiasts, whom I hold in highest regard, what other groups of amateurs are really working on new developments? You see, amateur teletype is quite different from commercial and military teletype operation in that we have to take into consideration not only fading and QRN, but also $$$ and QRM. Most of the amateurs that have so far done the bulk of the exploratory work in RTTY don't have the price of a good communications receiver. So much for the $$$ problem.

Well now, you've had the hot news about why RTTY is the saviour of our decaying pioneer instincts, etc. All that stuff is just justification which we trot out in defiance of our critics, be they CW men or our wives. It is all well and good to be doing something for posterity, but unless we are a lot more integrated than most

(Continued on page 50)



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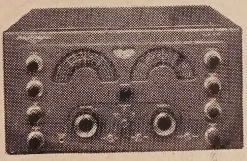

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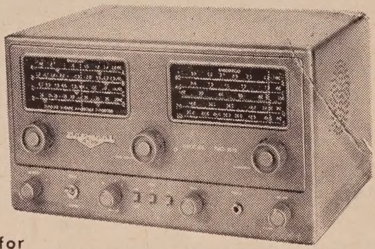

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		403	425	448	470	492	516
370	383	405	427	450	472	594	
372	385	407	429	451	474	496	
374	387	408	431	453	475	498	
375	388	411	433	455	477	501	
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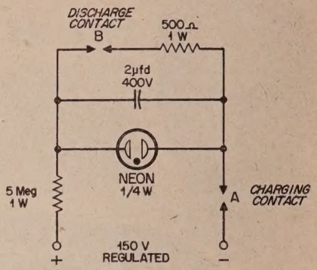
(from page 48)



Single-flash end-of-line indicator.

available people we are more interested in the present and immediate future than we are in something as vague as the Ham pioneering spirit. What it comes down to is that RTTY is a heck of a lot of fun. You acquire a feeling of accomplishment when you get your printer running that may well vie with the thrill of your first QSO. Oh, you get rather used to it after a few years I guess, but judging from the number of ex-service men with TT experience and the number of TT repairmen who are getting on the air it must take longer than you'd think. I know that W2BFD has been at it for eight years now and is still going strong. I only started in five years ago.

Plethora

An exaggeration, to be sure, but at least there seems to be adequate reason to let out an occasional whoop of excitement. There are definite signs that one of the large telephone systems, either in whole or in parts, may soon recognize its debt to humanity and stop destroying unwanted teletype machines. This could bring enough printers into amateur hands to satisfy everyone. The deal isn't definite yet, but the mere suggestion that it is pending is a major victory of the forces of good over evil. I'd rather be worrying about how to get rid of printers than where to find them.

Activity

Just about every letter that comes in these days says that the sender is all set for FSK or else expects to be set within the next few weeks. The summer QRN has ganged up with the hot weather and vacations to limit activity during the July-August period, but come September there should be a rapidly rising number of stations holding forth. A reasonable guess as to the activity that we may see, come fall, is about 400 stations on the low frequencies.

DX has already been rearing its welcome head for the summer operators. W4OYG fired up on 20 meters and had a three hour QSO one morning with KA2WW. He has also worked OE13BR and has schedules coming up with DL4KA. Operation has been both on the high and low parts of 20 (14380 and 14150).

End-Of-Line Indicator

One problem that faces all owners of strip printers and tape perforators is a means of counting the characters that they are sending so that they can send the "Carriage-Return" and "Line-Feed" signals at the correct time for those people who are using the page type printers to copy them. To the uninitiated it should be explained that there are two basic types of teletype machines, the strip type which print on a narrow strip

(Continued on page 52)

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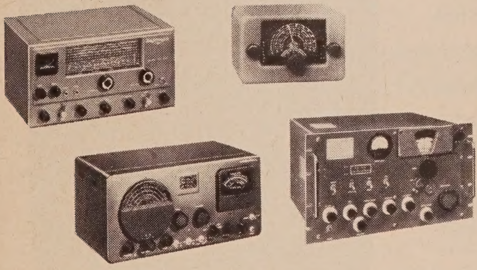

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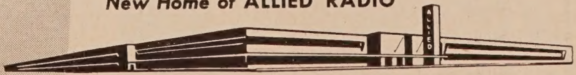

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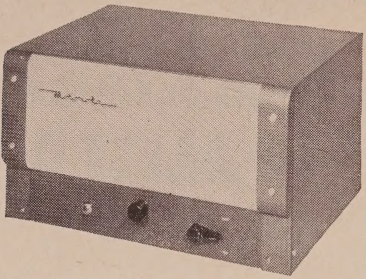

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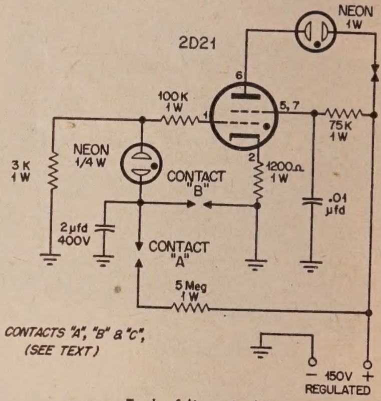
(from page 50)

of paper such as is used for telegrams and stock tickers, and the page printer type which are used for news ci cuits and TWX circuits. Therefore the fellow who is sending from a tape type printer needs some sort of indication of when he has sent the 72 characters whic the page printer will print per line.

Here are two circuits doped out by Graham Claytor, W2MYL, for use with his Model 14 printer and hi tape perforator. The first circuit is quite simple an gives a short flash of the neon bulb when the end of th line is near. The second circuit lets the neon bulb turn on when the end of the line is near and doesn't tur it off until you hit the "CAR RET" key. The 5-megohm resistor is only approximate and should be adjusted t



End-of-line indicator.

(Continued on page 54)

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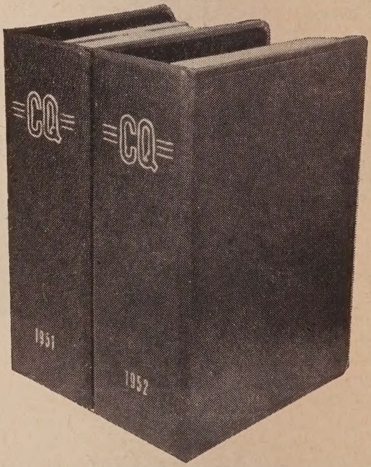

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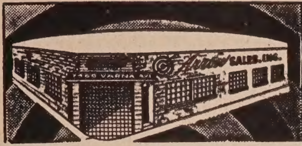

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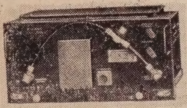

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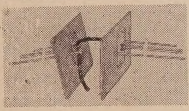

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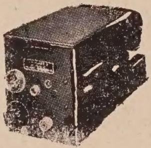

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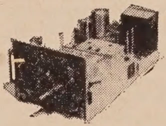

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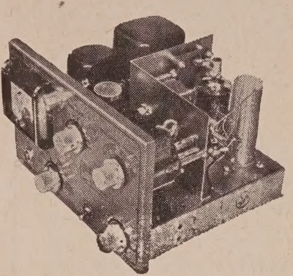

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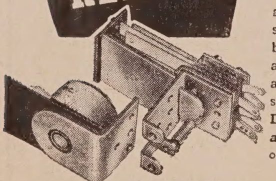

★ Coil assembly includes coil and field piece. Contact assembly consists of switch blades, armature, return spring and mounting bracket. Standard and Midget contact assemblies in either S.P.D.T. or D.P.D.T. are *interchangeable* and can be used with any of 13 coils described below.

CONTACT SWITCH ASSEMBLIES

CAT. NO.	TYPE		COMBINATION	
200-1	Standard	8 amps	Single Pole	Double Throw
200-2	Standard	8 amps	Double Pole	Double Throw
200-3	Standard Contact Switch Parts Kit with complete assembly and wiring details			
200-4	Standard	12 5 amps	Double Pole	Double Throw
200-5	Standard	8 amps	Four Pole	Double Throw
200-M1	Midget	8 amps	Single Pole	Double Throw
200-M2	Midget	8 amps	Double Pole	Double Throw
200-M3	Midget Contact Switch Parts Kit with complete assembly and wiring details.			

13 COILS ASSEMBLIES

A.C. COILS*

CAT. NO.	VOLTS
200-6A	6 A.C.
200-12A	12 A.C.
200-24A	24 A.C.
200-115A	115 A.C.

D.C. COILS

CAT. NO.	VOLTS
200-6D	6 D.C.
200-12D	12 D.C.
200-24D	24 D.C..
200-32D	32 D.C.
200-110D	110 D.C.
200-5000D for current type	

*All A. C. coils available in 25 and 60 cycles

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(from page 52)

allow the neon bulb to flash after 65 characters have been sent. The 2.0 μfd. condenser is critical and should be of highest quality oil filled construction so as to have very low leakage. If there is any appreciable leakage the circuit will tend to discharge during slow or interrupted typing.

Contact A is installed so that it makes a short contact every time a character is sent. A good place to put this contact is on the transmitting distributor. Graham wrapped a piece of piano (stiff) wire around the end of the short arm on the transmitting distributor that kicks out for every character and fed the wire through the hole (where the spring is hooked) and had the wire push two contacts closed. **Contact B** is mounted directly under the "CAR RET" key so that pushing the key closes the circuit. **Contact C** is a normally closed contact mounted under the "LINE FEED" key. This contact removes the voltage from the thyratron, causing the neon bulb to go out, whenever the "LINE FEED" is pressed. With this circuit the small neon bulb turns on the thyratron which in turn lights the one-watt neon bulb. It is fairly easy to miss the short flash of a ¼-watt neon bulb, but the one watter, when all lit up, can't be missed.

The same circuits work fine for the keyboard perforator, except that the 5-megohm resistor must b changed from 200,000 to 500,000 ohms to make up for the much shorter time that **Contact A** is closed for each character. **Contact A** is mounted under the perforator so that the ratchet gear will kick it. There is plenty of room for the 2D21 under the perforator, too. **Contacts B** and **C** are connected the same as in the printer.

SINGLE SIDEBAND

(from page 22)

In this case the X is 260 ohms, and F is the operating frequency in megacycles and C is in microfarads. For 3.9 Mc. operation the required tank capacity comes out to be 157 micro-microfarads, for 7.2-Mc band operation—85 $\mu\mu$fd., and 14.2-Mc operation—43.3 $\mu\mu$fd. Consulting the information available on coils, the *B&W 40 MEL* coil would be suitable for tuning to the 80-meter band, the *20MEL* coil for 40-meter operation and the *10MEL* for 20-meter operation. *Table III* gives this information in a more orderly fashion. It would appear that a 225 $\mu\mu$fd. or a 250 $\mu\mu$fd. single-section condenser would be called for in the grid circuit.

So there! The pencil pushing is over and I don't think anyone strained their "think boxes" too badly. A little understanding of what was going on and some eighth-grade arithmetic was all that was required.

Circuit Details

Refer to *Fig. 2* for the following comments. The circuit is conventional in all but a very few respects. The filament circuit, you will notice, is wired up for 10-volt operation. This was done because the shack transformer stock furnished a 10-volt, 13-ampere transformer instead of a 5-volt, 25-ampere unit. The center tap of the tube filament connections was used as the cathode return point. Both sides of the filament voltage line were bypassed at the tube socket with good quality mica condensers. The plate-current meter, or more strictly,

(Continued on page 56)

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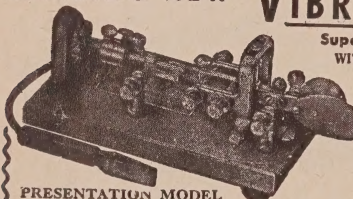

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(from page 54)

the cathode-current meter is connected from the tube-filament center-tap point to ground with appropriate r-f bypassing.

The parasitic resistor *R1* and *R2* are in the grid circuit and grid-neutralizing leads respectively. Their values are not critical but non-inductive resistors are mandatory. The *R2* resistor should be at least four-watts in size for the following reason: During tune-up periods if the antenna loading should be light and the final running at resonance with grid excitation, the circulating r-f currents in the output tank circuit and the neutralizing path back to the grid run very high. This condition doesn't have to exist long before resistor *R2* goes up in smoke. Don't think you can get along without these resistors because you can't. The amplifier without these will take off and be over the hill before you can even think about hitting the plate-voltage switch. As one fellow puts it: "One reason I think SSB is free of TVI is because you are compelled to clean up all traces of parasitic oscillations and fundamental instability before you can ever get the transmitter on the air." I suspect that there is more truth than poetry in that statement.

The plate tank circuit is conventional with possibly the exception that on the 80-meter band vacuum padder condensers had to be added to reach the necessary capacity to enable tuning the *B&W 40TVH* coil to resonance. It was necessary to use two 50-μμfd condensers connected in "split-stator"—that is, from each end of the coil to ground, and one additional 50-μμfd padder across the entire coil. If it is possible to place all padding condensers in balanced fashion (split-stator) it should be done, but for the rather obvious reason of parts shortage it was necessary to do as shown. With the padding shown it is possible to cover the entire 3.5 to 4.0-Mc band with the variable 150-μμfd per section tank condenser. The 50-μμfd padders used were the 5-kilovolt vacuum padders that have been available on surplus in antenna tuning units for ARC-5 series aircraft transmitters.

The output circuit link coil you will notice in *Fig. 2* has a fixed mica condenser, *C13,* across it. This has been found necessary to tune the link to resonance at the particular frequency in use. It is a well-known fact that even though the transmission line is perfectly "flat" difficulty can be encountered in properly loading a given final amplifier. The link must look like a pure resistance to the transmission line if easy loading is to take place. There are happy coincidences when the capacitive reactance of a "hot" feed line will tune out the inductive reactance of the link, but don't sit down and wait for this to happen. Ordinary 600-volt "postage-stamp" mica condensers work well in this place. One precaution—never operate the amplifier with the antenna disconnected and the condenser *C13* fastened across the link. It will pop before you know what is happening. The same tuning result can be accomplished by a small variable condenser in series with the center lead of the co-ax line at the link coil. About 50 $\mu\mu$fd. to 100 $\mu\mu$fd maximum capacity would be required.

Constructional Details

While the following comments are intended as a guide, the author doesn't seriously believe anyone will build a "Chinese Copy" because every Ham inserts some of his own ideas into each item that he builds. *Figure 3* shows a sketch of the general lay-out of the amplifier. Use it as a guide and be influenced by whatever components you have available and your own particular preferences.

You will notice that the grid tank circuit is enclosed in a home-made box. The author's experience with a previous 100TH linear amplifier prompted this measure. When grid current is drawn the sharp transient generated by crossing from the no-grid-current to the grid-current condition causes harmonic frequencies to be generated and is capable of causing a mild case of TVI. As many Hams have found out, their class C finals cause TVI when only the final grids are being driven—no plate voltage necessary; in fact, the TVI usually decreases when the plate voltage is applied. This was the only TVI counter-measure that was taken in the amplifier—no low-pass filter, no shielding of the cabinet—and the TV set operates meek as a kitten only ten feet away.

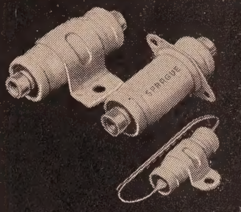
For lack of a better way, the plate tank coil was mounted on an inverted "U" shaped channel made out of light-gauge aluminum. This was fastened by the condenser frame screws to the variable tank capacitor so that the mounting channel was at ground potential. The coil jack-bar was then supported by ceramic stand-off insulators on the "U" shaped channel. It was as simple an arrangement as I could arrive at and still have plenty of mechanical strength. I am sure that someone else could come up with a better one without much trouble.

One of the vacuum padders was mounted so that it connected directly to the heat-radiating plate cap of the tube. It was supported by the plate cap and a pillar of one-inch diameter "dural." This provides a short path for any stray harmonic currents that might exist.

The filament transformer was mounted under the chassis so that the high-current leads could be as short as possible. Unfortunately, the transformer is slightly taller than the three-inch chassis, so when removed from the rack and resting on the floor or work bench the chassis does not "touch bottom" all around. Oh well, it is just one of those things—as they say.

The Plate Voltage Supply

There isn't a great deal that can be said concerning this because a fellow is usually "stuck" with just certain components for his h-v supply. Naturally, the best plate-voltage regulation is desirable but I know that very few of you are going out and invest in a new 3000-volt transformer just to better your voltage regulation. Let's see what



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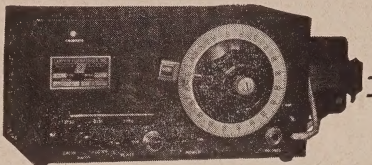

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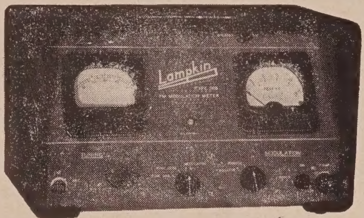

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can be done with what we have. As all the books tell us, choke input helps the regulation—so use that by all means. For an irregular load requirement such as speech imposes, plenty of filter capacity is mandatory. By "plenty" I don't mean 8 or 10 microfarads, I mean more like 16 or 20 microfarads. This bank of condensers will absorb the shock of much of the variable component of the plate current and will only "bog down" on the longer sustained speech tones. Put as much capacity on as you can afford and wish for more—that's the usual case. In the author's case, 17 microfarads is used and the plate voltage does not drop more than 250 volts below the idling 3000 volts for a full SSB kilowatt input.

Neutralization and Tune-Up

Once the amplifier is built the problem of adjustment arises. The stage operates like most every other amplifier I have ever built. The neutralization procedure is conventional in that the initial adjustment should be made as you learned years ago in kindergarten with the plate voltage off and grid excitation applied. Tune the plate tank to resonance as indicated by an output indicator (lamp and loop, field intensity meter, etc.) and adjust the neutralizing condenser *Cn* for minimum indication on the indicator, meanwhile keeping the plate tank tuned to resonance after each adjustment of the neutralizing capacitor. When this is completed, reconnect the plate voltage and using a dummy load, recheck the neutralization by the "dynamic method." When the plate tank condenser is swung through resonance the plate current should reach a minimum reading at the same dial setting that the grid current maximum occurs. A little practice is necessary to be able to watch two meters

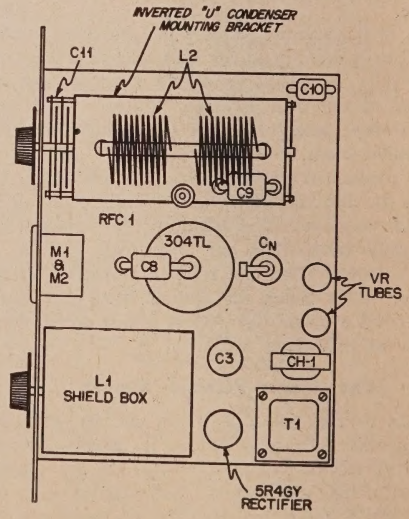
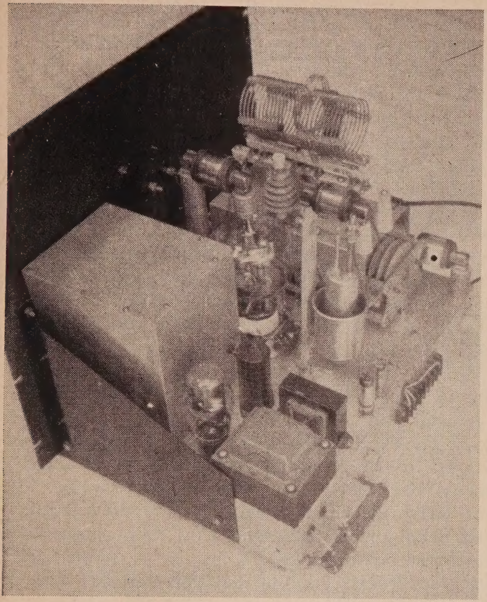


Fig. 3. Sketch showing general layout and placement of parts. Scale approximately ¼.



Rear view of the one-kw linear amplifier, showing general placement of parts. Individual parts are identified in the sketch, Fig. 3.

simultaneously—my eyes haven't recovered yet! The final adjustment shouldn't be far off what you arrived at by the no-plate voltage adjustment. *PRECAUTION!* Don't adjust the neutralizing condenser when the plate voltage is on—readers are hard to find these days.

Operation

You are now on your own. The operation is similar to most class C amplifiers in tune-up and shouldn't cause any raised eyebrows. A check on proper loading should be made with an antenna current meter or antenna field intensity meter to make sure that optimum coupling is obtained. For a given plate input power the link adjustment should be made for maximum power output. This adjustment should be made at some power level near maximum capabilities of the amplifier. I suggest that a linearity test be made using the two-tone test described in *Part V* of this series. I also would suggest that a 'scope be used to monitor the output of the amplifier to make sure that no "peak-limiting" distortion is present. The amplifier is capable of delivering one-kilowatt "meter average" on SSB and the peaks swing up in the neighborhood of two kilowatts. As explained in an earlier session this is perfectly legal—just keep your meters reading below one-kilowatt.

A check was made of the output power and on 4.0 megacycles with a steady-state kilowatt input, the output power measured 550 watts into a dummy load. That is an efficiency of 55% which is below

(Continued on next page)

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(from preceding page)

the 65% usually predicted for this type of service, but remember we have our loaded tank Q pretty high, so this probably accounts for the slight lowering of the output power. If you are interested, no grid current is drawn until the input exceeds 750 watts, so you can go a long way before you need be concerned with grid current.

The power required to drive the amplifier with the indicated grid swamping is between 15 and 20 watts peak. A swamping resistor of higher value could be used with appropriate changes in the grid tank if less power is available. Remember, it's wise to generate a lot more than you actually need—you won't be sorry.

As this is the last of the SSB series, I would like to thank all of you who have passed along comments and suggestions both over the air and by mail. The results have been gratifying. If you have gleaned a little information from these feeble words I feel that I have rendered some service. If you "make the plunge" and derive as much enjoyment from tinkering around with SSB equipment and operating the stuff on the air as I have for over four years, I know that you will be "sold." See you on SSB!

YL's FREQUENCY

(from page 24)

built himself. With it she uses a Collins VFO, an SX-28 receiver, and a very FB speaker housed in a separate cabinet. Though the rig is all-band, she operates mostly 20 phone, using a 3-element beam, which she built all by herself, and which is mounted on the roof of the house.

Eunice had many other things of interest—an old audiotron tube from the first shipboard station Louis operated, crystal detectors, old tubes, a Ford spark coil —with which Louis called a CQ one day and raised a Ham some 500 miles west of San Francisco! On her operating desk was a lovely copper ash tray with her call, W5ZA, in an arch across the top. It was made from a copper plate from old oil-immersed condensers in the original W5ZA rig. And in a place of honor on her desk was a silver loving cup. On it was this inscription: "Dept. of Commerce. Donated by Herbert Hoover. To be awarded to the owner of the best all around amateur radio station in operation during the year 1921, the major portion of which has been designed and constructed by the amateur himself. Louis Falconi, W5ZA." No wonder Eunice is proud of W5ZA.

But Louis wasn't very proud of her on one occasion —that is, when he learned about it. Eunice thought she had the rig turned off. Then she lifted a small chassis to put it on a shelf. As she did so she touched a live wire—and one knee was against ground. Some 700 volts knocked her cold! he came to by herself, but she didn't dare tell her OM what had happened. Then within a month a white patch showed in her hair—which she promptly dyed!—but the patch grew larger and larger, so after six months she gave up. Of course the OM noticed it immediately and wanted to know what had happened to her! She has lovely white hair now, but recommends the beauty shop rather than trying the quick way she did.

Eunice keeps very busy with her other interests and hobbies. For three years she ran her OM's radio sales and service business but then sold it. Now she works half days and also tends to her real estate, much of it rental property there at her home. Her son is an aeronautical engineer but after the rigors of wartime work he prefers farming and flying a sail plane for a hobby. His wife loves horseback riding and they have a ranch not too far from Eunice.

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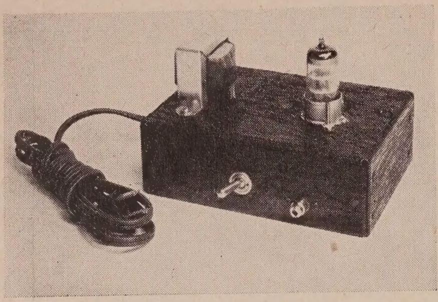

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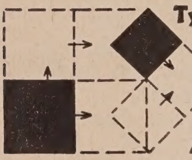

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Eunice has a Siamese cat to keep her company. While we stroked his silky fur she told of when she had kept several Siamese kittens in her radio room as it was the only place available. She carefully covered up the transmitter to keep them out. But you know curiosity and a cat—soon she found little kitten paw prints on the shelves inside the rack. Then one day a kitten touched his nose to a hot wire—and learned a healthy respect for that "playground."

Eunice's other hobbies include golf, bowling, gardening, guitar and piano. But tops among them all is golf. She has played for many years—left-handed, too. In addition to all the radio trophies her lovely home was filled with golf trophies—loving cups, figures, silver dishes and bowls. Her latest was a silver bowl won in this year's Southwest Championship Flight.

If you're ever in Roswell, or hear W5ZA on the air, take advantage of a QSO—surely you'll enjoy getting acquainted with Eunice even as we did. FB, gal!

33 es CUL—**W5RZJ**

DX NEWS

(from page 31)

contacted Capt. Carlsen on the S.S. Flying Enterprise II, during his recent trip from Colombo to Hong Kong . . . CR9AH is Chief Engineer of Macau's BC station, CR9XL . . . F7SHP, The International Amateur Station of 'SHAPE' is now on the air. Any licensed op of the 'NATO' group is welcome to operate this station. Power input is 350 watts and a "collectors item" QSL will be sent. The assigned MARS call for this station is "FAA900". See QTH's . . . KV4AH now works for All American Cables in Lima, Peru . . . W1JNE, ex JA3, now operates from Goose Bay as **W1JNE/VO6** . . . July 17th and 18th were highlighted by the appearance of AC4NC in Tibet. QSO's were reported by G3AAM, G4CP, KA2NY, W6UHA, W6FSJ, W6SC and W7HXG. AC4NC, Chak, said it was the first time in two years that he had been permitted on the air. Probable times and freq. for him is 14118 kc. 1200 to 1700 GMT. QTH as follows: N. Chakravarti AC4NC, Via A.R.C.I. P.O. Box 6666, Bombay 20, India . . . Restrictions in YO-land also seem to have been loosened with QSO's between 'yours truly' and YO3RF and YO3RD . . . ZL2FA reports ZC3AA active on 14006 kc. . . . PA0UN moves to FB elevated QTH in Huizen. A Vesto 50-foot tower will take care of the beams . . . W5FXN moved to his ranch in July and has his Vee Beam up . . . ZL activity continues on 160

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Mexico 6, D.F.
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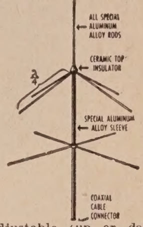
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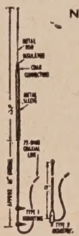

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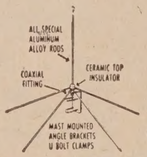
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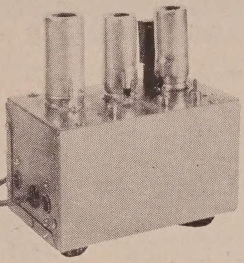

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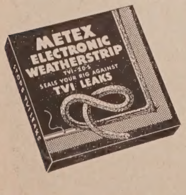
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(from preceding page)

Errata: Contest Results

W5JUF thru error was left out of the final phone scores of the 1952 DX Contest as shown in the July issue. Following is the pertinent data that should have been included and the awards will be adjusted accordingly:—

	ZONES	COUNTRIES	SCORE
All Bands	33	59	18,676
3.5 Mc.	3	4	21
14 Mc.	26	51	14,861
28 Mc.	4	4	56

---

meters Sundays 0900 GMT with ZL1AH, ZL1WW and ZL1HY on one end and W1BB, W2WWP, W9NH and W8LPW . . . HB9ET was contacted, flying the Atlantic on July. He returned night of July 6/7. The call was **HB1ET/AM** . . . **W6IBD/2** is now set up in Haddonfield, N. J. W6FSJ visited him recently and was amazed by the sight of fireflies in the vicinity. Yep Wendell, those gadgets come in handy to power transistor rigs once you filter out their QRM on 5600 Mc.

CP1BX made several concessions to the XYL and, as a result, will soon be on with a Globe Champion rig . . . W3BXE, presently at FP8AA with W2BBK, sports a new call, **K2CPR** . . . **VP2MD** seeks QSL's from N.D., Nev., Wyo., Ky., N.C., Vt. and N.H. to complete WAS (14017 0130 GMT) . . . **VP8AP** is safely home now and was worked from G6YQ. John skeds W6EFV from GM3DMD. See QTH's . . . **W4LZF** reports that **ex-KG4AF**, Burt, is now being located in Norfolk, Va. Navy Yard . . . KS4AQ is now **KZ5ES** . . . Election of Officers in the Northern California DX Club resulted as follows: President, W6JK; DX Editor, W6PB. W6LW continues as Secretary . . . Bill, ex op at Club station KH6UL is now active from **W0ZAM** . . . W4SAT spends Summer at Columbia, Ky. **W4SAT/4** and then heads for MIT in Mass . . . **VP4LZ** returned to the air in July after vacation. He will be on between flights to Rio . . . **DL4LD** is now manned by KP4KA ex-W6YOR . . . **W0YXO**, paused in his DX activities to get married. Honeymoon was spent in VP7. Our heartiest best wishes go to YXO and XYL Meta . . . W4YCQ ops at **DL4IQ** . . .

Tasmania, VK7.

From Ray Kilby, VK7RK, who is now handling VK4QL's column in "Amateur Radio" we received the following: I am enclosing a newspaper clipping from our local daily and after reading it, if you don't agree with my old old contention that VK7 should again be a separate country, I'll eat my socks. Quote:

IN A CORONATION ARTICLE ENTITLED "THE QUEEN'S PREMIER," THE ENGLISH MAGAZINE "TODAY" LISTS CHURCHILL, ST. LAURENT, MALAN AND HOLLAND. NEXT IN THE LIST COMES: "ROBERT COSGROVE M.H.A., THE PRIME MINISTER OF THE LARGE, SQUARISH ISLAND 140 MILES OUT TO SEA FROM THE AUSTRALIAN MAINLAND. ALTHOUGH DEPENDING FOR MANY OF THEIR RESOURCES ON THEIR GIGANTIC NEIGHBOUR, THE QUARTER MILLION CITIZENS OF TASMANIA HAVE ENJOYED AUTONOMOUS GOVERNMENT SINCE 1856 . . . THE ISLAND IS VERY MUCH A SEPARATE COUNTRY IN ITS OWN RIGHT."

(Continued on page 64)

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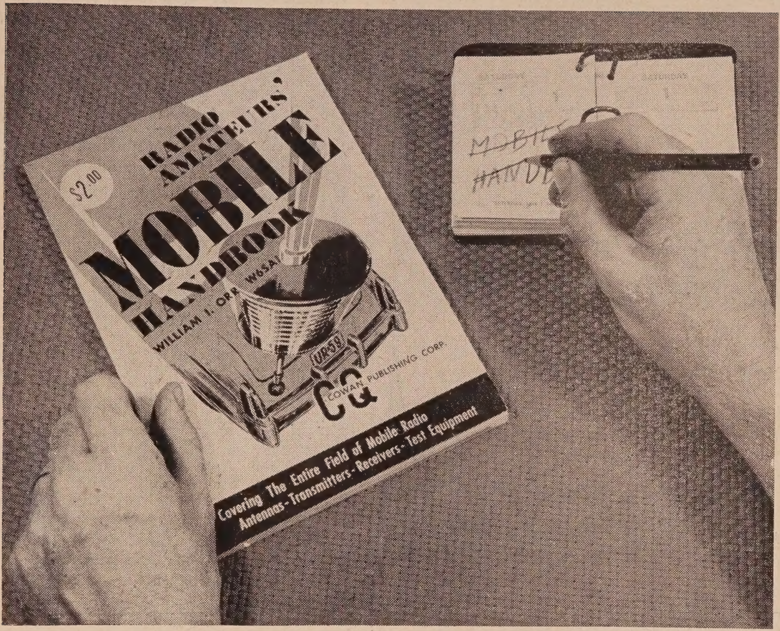
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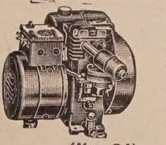

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(from page 62)

G6YQ's No. 202 QSL arrived from SV0WG (Rhodes) . . . G4CP reiterates that all QSL's for SU stations in the Canal Zone (Suez) must go via RSGB . . . W6MJG pounds brass at DL4EU . . . VE8AW runs PP 304TL's but say they might as well be 201-A's with the poor VE8 conditions . . . Tom, **VS6CQ,** will cooperate with anyone desiring 3.5 Mc. QSO with Hong Kong. He listens on that band 0600/0700 GMT and 2100/2200 GMT. Main operating times on 14 Mc. are between 1300 and 1400 GMT . . . G3FXB should be heard from again in Sept. Al will be in new QTH and have his TVI troubles settled by that time . . . A further report on 160 meters comes from W2WWP who advises he is still working ZL1WW and ZL3RB mornings, from 0900 to 1000 GMT. W's call on the even five minute periods and ZL's on the odd. These test periods occur on Wednesdays and Sundays. ZL stations are heard around 0940 and fade out around 1015 GMT. Tests will probably continue until Sept. or Oct. when QRN takes over in ZL-land. In addition to stations already mentioned the following also take part in these tests: W2EB, W0NWX and ZL2ACV. More W's are needed here and are invited to participate . . . Vic, SM5KP, visited Thailand on flight to Tokyo . . . Joe, **KL7AWB,** ex-W3MTQ/W4SEB/K3USA, complains about the three eighth inch layer of dust covering everything. This is the result of volcanic activity in his vicinity. See QTH's . . . W8DHQ and W8TNE dropped in on KV4AA.

W2WZ is on again after a three-month pause to rebuild his antennas. Al now has three beams, 14, 21 and 28 Mc., on one boom and a 7 Mc. GP which heads up for the top of his 45-foot house . . . **DL4DU** is Ed, W2ULP . . . Via W6TI we hear that W4NDF was **HS1SS** from Nov. '48 to Nov. '51 . . . SL prefixes are all military stations in SM-land . . . G2MI did not meet the Spanish Delegation in Lausanne, as reported (re-EA9DC), as they did not attend . . . W0ELA (via West Gulf Bulletin) advises that **MP4KAI,** Kuwait, vacations in July and August but will be back on the job in September. **MP4KAB** is active on phone but is not very enthusiastic due to very poor conditions . . . We regret to record the passing of Reg Fox, AC4YN. This call will not be easily forgotten.

New DX QTH's

CE3DZ —	Alfredo Quintana, Ave Suecia 1205, Santiago, Chile.
CR5SP —	Perciva da Silva, C.T.T. Sao Tome, Portuguese Africa.
F7SHP —	Radio F7SHP, Radio Sec. Hq. Sig. Off. APO 55, P.M. N.Y.
KA3AF —	1st. Comm. Sqdn. AF. APO 710, P.M. San Francisco, Calif.
KL7AWB —	Joe, Box 219. Anchorage, Alaska.
KM6BG —	Box 23, USCG. Air Det. Navy 3080. FPO. San Francisco, Calif.
KZ5EU —	Art Welch, Box 52. Cocoli, Canal Zone.
VP1AB —	Father Phil Pick, Corozal, British Honduras. C.A.
VP7NS —	Don Thompson, Box 48, Nassau, Bahamas, BWI.
ex-VP8AP —	John A. Brown, Alisdair, 1 Meigle Road, Muirhead, Ofleff, Dundee, Angus, Scotland.
VQ5CY —	Box 142, Kampala, Uganda, Africa.
VQ5RO —	Via R.S.G.B.
VR6AC —	Floyd H. McCoy, Pitcairn Post Office, Pitcairn Island, Pacific.
W5ZOJ/KJ6 —	APO 105, PM. San Francisco, Calif.
XE Bureau —	QSL Bureau, LMRE AC., Liverpool 195-A, Mexico 6 DF. Mexico
YV1CB —	P.O. Box 389, Maracaibo, Venezuela.
ZP5AY —	Felipe, Box 512, Asuncion, Paraguay (QSL Bureau for ZP).
5A1TJ —	Don Rowley, Box 372, Tripoli, Libya.

Thanks to West Gulf Bulletin, W5FXN, W5WI, W3JNN, W6GPB, W6TMP and SWL Roy Waite.

NOVICE SHACK

(from page 43)

years, I'm not a Novice; yet I find your **Novice Shack** very interesting. Though I have seen the United States only in the movies, I like them very much, and I would be very interested in exchanging letters with some W or WN boys so I could improve my English. I've been learning it four years in High School and, moreover, I have been to England, but it is not yet perfect. . . . I am using a home-built four-stage transmitter with an 807 running sixty watts in the final stage. It is completely bandswitched, except for the final stage coil. I wish I could have such a fine receiver as the S-38B, Unfortunately, I do not have money enough to buy any receiver, so I am using a home-made, seven-tube superhet, and I've been fighting all the three years long to get rid of the broadcasting images in the 14-Mc band. . . . I work either on phone or CW, mostly on the 14-Mc band, having worked sixty-five countries, with fifty-four confirmed. Here in Italy, we can get our license, which is still a provisional one, quite easy, without any examination. Our power input is limited to 100 watts, and we cannot relay traffic. . . . Only a little part of the Italian boys work on CW (as the knowledge of it is not necessary for obtaining the license), most of them being old timers. The others use phone and rag-chew on the 7-Mc. band. . . . Radio equipment is not cheap in Italy, so the great majority of us build our own equipment at the peril of TVI'ing all around. . . . I like to work W stations and U. S. amateurs overseas, but I do not have much time to devote to Hamming, as I am in the last year of High School. . . . No more. Just a reminder that I'll reply, as soon as possible, to all the letters I receive from W boys and girls of my age. (I am nineteen.) 73 to everyone"—Mario. Mario Giganti, I1CWZ, Viale Regina Margherita 30, Milano, Italy.

Jim, **WN9WWJ**, writes, "Dear Herb, following my letter in the July column was one from Cliff, WN4ZFL. Right after reading about him, I called CQ on 7176 kc. Guess who answered me. Yes, it was WN4ZFL/9! I was certainly surprised. . . . I dug deep and got enough money to get on 7 Mc. My first few contacts were with Michigan and Iowa, so I got up at 4:00 a.m. for some DX. My first contact was Madison, Wisc., hi. But then it started. Pennsylvania, New York, Ohio, W. Va., Ala., etc. After being on 3.7 Mc. so long and not getting too much DX, hitting 7 Mc. is like starting out with 500 watts! My **Philmore** puts out eighteen watts on 7 Mc. . . . The equipment reviews and other **Novice Shack** columns have great interest—very great. You sold me on having a wavemeter and now a c-w monitor. . . . One thing more, WN9YFU is organizing a 3.7-Mc net. Any Wisconsin Novices who are interested should contact him. 73"—Jim, W9WWJ.

Tom, **WN9WJI**, writes, "I just passed the General Class and am expecting. I have worked twenty-three states, using a 6AG7—6L6, running thirty watts. . . . My buddy, WN9WJG, and I are helping a friend become a Ham. Of course, the friend being a YL could have nothing to do with it, hi. Incidentally, I am sixteen years old and would like to help anyone else to become a Ham. 73"—Tom Hamel, WN9WJI, 217 West 106 St., Chicago, Illinois, phone: PU 5-1353.

Every now and then, I get a letter from prospective Novices complaining because they will not be permitted to operate phone on the lower-frequency bands. Usually, they seem to be under the impression that they must operate CW for a year. Actually, this is not true. As soon as they qualify for a General Class license, they can go one phone. Frequently, though, after operating on CW for a while, it turns out not to be the penance they assume it must be. The following letter indicates this.

Bill, **W4YPY, writes,** "I thought that I would not like to work CW after getting my General-Class license, but there is a lot of fun in it. The phone bands are now so crowded with 200-watt (and upward) stations that it takes a good signal to ride through the QRM, and a good signal of that wattage I do not have. So I guess I'll stick to CW a while."

Bill also said, "My General-Class license got here on Friday, June 19, just in time for Field Day. I was to

(Continued on next page)

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(from preceeding page)

take a couple of fellows up to our FD site on Friday night. Boy, was I glad to see that little slip of paper in the mailbox. . . . As a Novice (as all the General Class boys say), I worked and got confirmation from twenty-nine states and VE3. Some I worked and never got a card from, so I don't count them. I was running sixteen watts then. Now I have a **TR-75TV** running fifty watts on 3.5 and 7 Mc. 73"—Bill, W4YPY.

Dave, **WN8MUR**, asks a question and gives the answer. "Dear Herb, Is it possible for a TV set to transmit a signal? I'm sitting here at my S-38C receiver, tuned to 3.6 Mc., and picking up the audio portion of a TV program. The TV receiver is located about fifteen feet from the S-38C, with the two antennas side by side. When I snap off the TV receiver, the signal in the S-38C disappears. 73"—Dave, WN8MUR.

Obviously, the TV receiver is radiating a signal, probably at its intermediate frequency. This signal may then be heterodyned by a harmonic of the oscillator in the S-38C to produce a 3.6-Mc signal, which is picked up by the S-38C. There are a dozen similar possibilities. If the phenomenon is annoying, a high-pass filter (See **Fig. 2**) will probably cure it.

Wayne, **WN7TFY**, gets right to the point. "Dear Herb, I have had my license now for three months. In that time, I have contacted ten states—California fourteen times, KL7 twice, and VE6. My best DX report was RST479 from W4WOG in Alabama. Receiver is an **S-20R**. Transmitter uses a 6V6 with a maximum input of fifteen watts. The antenna is a doublet. 73"—Wayne, WN7TFY.

Frank, **K2CNL**, presents himself as Exhibit A to prove that age has nothing to do with becoming a Ham. He says, "Dear Herb, This Ham is fifty-eight years old and a grandfather. I got interested in April, 1952, and joined the North Jersey Radio Mobile Club. The members worked on the code and theory with me. I passed the examination in December and got my call in January. Hope to make my grandson a Ham in a few years. 73"—Frank, K2CNL. Frank, incidentally, is Chief of Detectives, under Sheriff Bonnet, Essex County (Newark), N.J.

Jack, **WN0KXZ**, reports for himself and Arv, **WN0NOM**, both of Brookings, S. Dak. They believe in home-built rigs. Jack's is a pair of 807's in push-pull, driven by a 6AG7, and Arv's is a 6V6 driving an 807 to a "Novice gallon"—seventy-five watts. . . . Jack is interested in experimenting with antennas, and if you have any ideas, he would like to hear from you. Give full details, and he promises to answer all letters. His address is: Jack Headley, WN0KXZ, 929 Tenth St., Brookings, S. Dak.

Lee, **WN0MVH/0**, says, "Dear Herb, I am fourteen and will be a Sophomore next year. I have worked nineteen states on 3.7 Mc., and was I surprised when I found a picture of my first Florida contact (WN4YOX)

CROSSWORD SOLUTION

(To puzzle on page 40)

1 R	2 A	3 D	4 I	5 O	▨	6 T	7 U	8 B	9 E	10 S
11 E	M	E	T	I	12 C	▨	13 S	A	M	E
14 L	A	▨	▨	▨	15 O	16 X	▨	17 T	F	C
18 A	T	▨	19 V	20 O	L	T	21 A	▨	▨	22 T
23 Y	E	▨	▨	▨	24 O	A	▨	25 H	26 I	S
▨	27 U	28 N	29 D	30 E	R	L	31 O	A	D	▨
32 Q	R	O	▨	33 A	C	▨	▨	▨	34 L	35 I
36 U	▨	▨	37 Q	S	O	▨	38 C	▨	39 E	D
40 A	41 L	42 P	▨	43 T	D	▨	▨	▨	44 S	A
45 R	O	A	46 M	▨	47 E	48 E	49 L	▨	▨	50 H
51 T	U	N	E	52 R	▨	53 A	U	54 D	55 I	O

in the Novice Shack. . . . I have two rigs. The one at home is a thirty-five watter, with an S-38 receiver. The one at the shop is my boss's, but I am the only one that uses it. Transmitter is a converted BC-457A and a BC-342N receiver. I work in a radio shop, which gives me lots of time for building rigs. (Some luck, huh) 73"—Lee, WN0MVH/0.

Bill, **KN6BFF**, writes, "Dear Herb, I just got my Novice license three days ago after waiting three months for it. While I was waiting, I kept listening to other Hams on 3.5, 7, and 14 Mc., and brought my copying speed up to eighteen words per minute.

"So far, I've made eighteen contacts on 3.7 Mc., with a home-brewed, 6J5-6L6 transmitter, twenty-five watts input. Antenna is a 130-foot long wire. Receiver is an S-38C, and I have no complaint with it. So far, my best DX is 200 miles at 8:00 p.m. I am going to try to get on 7 Mc. to try to get away from the dog-gone QRM. 73"—Bill (15), KN6BFF.

Joe Hussey writes, "Dear Herb, Thanks for printing my plea for help in **CQ**. I got a reply from the Piqua Ohio Radio Club, inviting me to attend their next meeting. I have been attending them regularly. They are helping me very much, and I hope to have my ticket before the summer is over. 73"—Joe.

Bob Foxworth writes, "Dear Herb, Strangely enough, I do not need code practice, but need help on the technical stuff. My receiver is a **Hallicrafters SX40**. I won't get my transmitter built until I get my license. It was designed by W2LBU, running fifteen watts to a 6AQ5, driven by a 6C4. K2CW will help me build it. 73"—Bob Foxworth. (Sounds like Bob has all the help he needs, both a transmitter designer and a builder!)

Jerry, **W8LON**, writes, "Dear Herb, If anyone needs help on the questions for the Novice exam, tell him to write to me. I am fourteen years old and was a Novice from October to January. I am now using a **Viking II, Viking VFO**, and an **S-76** receiver. For those who wish help, my address is: Jerry Basso, W8LON, 217 Wilson St., Ironwood, Michigan. 73"—Jerry. (Jerry also has his Novice transmitter and receiver for sale. If interested, drop him a card for details.)

Two candidates requesting help in obtaining a Novice license this month are:

Cal Kaylor (13), 250 Stratford Dr., Tuscon, Ariz., Tel. 6-1896.

Paul R. R. Signorelli, 14221 Riverside Dr., Sherman Oaks, Calif. (new address).

Chuck, **WN5YSC**, has worked thirty-two states since his last report, plus WH6AVH (Hawaii). Please QSL! If WN5YSC has not QSL'ed any station he has worked, it is because the card was lost or he did not have an address to mail it to. A card to 909 E. Pinedell Manor, Lufkin, Texas, will get you one. Chuck passed his General Class examination, June 18.

Once again, all the space has evaporated. See you next month. In the meantime, I hope the mail brings a letter and picture from you. 73"—Herb, W9EGQ.

HIDDEN TRANSMITTER HUNTERS

(from page 16)

With the edge of the loop pointed at the station for maximum signal, we get a reading of *S3*, which we make mental note of to check with later readings to make sure the signal will build up in the direction in which we are heading.

Straight north we go—three, four, five miles and the null swings around more and more to an easterly direction; slowly at first, but more rapidly until it bears due east. Turning right at the next crossroad, the loop, of course, shows straight ahead and a glance at the *S*-meter shows a reading of *S7* with the loop oriented for maximum strength, proving that we are drawing steadily closer.

Another mile ticks off and the bearing is changing again, this time to the northeast once

(Continued on next page)

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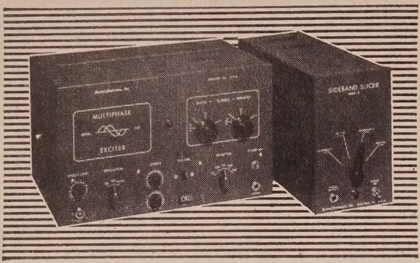

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(from preceding page)

more. Abruptly it begins to shift more rapidly and the volume builds up considerably at the same time—shut off the loop filament; we don't need an amplifier now and we might as well save the batteries.

Now we must be careful; we slow down, stopping the car whenever the hidden transmitter stands by, since we want to turn off to our left whenever the loop shows a right angle (due north) bearing again, and we're so close to the hidden transmitter now that we could easily go right by him between transmissions. And wouldn't we be confused by an east-west bearing again!

He's on the air once more; our bearing is due north and there's a barely discernible, little-used road turning off to our left, paralleling the railroad tracks. Up one hill and down another we go, making several turns and bends. The signal is so strong it overloads the loop, making it difficult to get nulls and the twisting road makes it impossible to keep track of the bearings we do manage to get—nothing to do but keep going and maintain a sharp lookout on all sides for possible hiding places. Now what! A sharp bend around a thicket of tall weeds and underbrush, and we're heading right back where we just came from—a deadend loop in the road! No signal from the hidden transmitter, either; he must have caught sight of us and closed down; but where is he? Let's take the flashlight and have a look around. He can't be very far away—he was blocking our receiver during his last transmission. Well, what do you know! There's a car over here behind the thicket we just circled; it's the hidden transmitter all right. He must have driven around the bend keeping just ahead of us with his lights turned off so we couldn't spot him. Well, all's fair in hidden transmitter hunts and we came in first, so we'll be hidden transmitter next week. Know any good spots? Shhh! Not so loud! Let's keep it to ourselves, huh?

Additional Suggestions and Hints

Experience, sometimes bitter, has shown the hidden transmitter should *not* be located (a) on private property, (b) in a boat, (c) on an island, (d) in a cave.

All transmissions by the hidden transmitter should be at least two minutes long to enable taking of bearings.

Identities of incoming cars should not be disclosed for at least 10 minutes after their arrival to avoid giving clues to other hunters who may have seen a particular car shortly before and, therefore, know that they must have been very close to the hidden transmitter at that location. A vertical antenna should be used by the hidden transmitter since loops do not show true direction of horizontally polarized waves.

And, finally, don't play your hunches—the loop is practically always right!!

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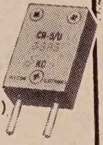

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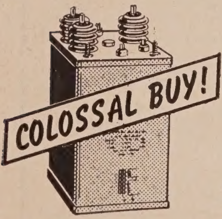
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HALLICRAFTERS SX-42. Would-be, but never did, "Ham," suffering from fat in the pocketbook five years ago, purchased SX-42 receiver and R-42 reproducer. Now only used to listen to broadcast band. In good condition, but I need the room. Best acceptable offer. All inquiries answered. Stanley E. Cohn, 146-17 Hillside Avenue, Jamaica 35, New York.

QUICK CAPACITOR CHECKER. Shows open, shorted, leaky, capacitors and electrolytics, and circuit continuity. Kit $6.75 p.p. Vemaline Co., Box 222, Hawthorne, New Jersey, Dept. A-4.

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FOR SALE, new 1625 tubes, same as 807 with 12-volt filament. 97c plus 3c postage each. Wanted: oscilloscope, audio generator and used test equipment. W7TBE, 318 West Galer, Seattle 99, Washington.

FOR SALE: HQ129X $150; 5" Dumont 208 scope $150. or trade for 35 MM slide projector and screen. Levern Glau, W0LVR, Route #1, Sioux City, Iowa.

FOR SALE: Collins 30J-18 transmitter, 450 watts fone and CW 813's pp final. 80-40-20-10-6 meters. Speech clipper, negative peak limiter, push-to-talk. Includes a 310 exciter. Price $498. W9LWS, Cuba City, Wisconsin.

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WANTED: APR-4, other APR-, APS-, APT; ARC-1, ARC-3, ART-13, BC-348, BC-221 etc.; TS-12, 13, 35, 120, 146, 155, 173, 174, 175, 323, other "TS-"; particularly Microwave equipment, spectrum analyzers; G-R, Ferris, L&N; 723A/B, 3C22, all tubes; manuals, meters, parts, cable. Littell, Farhills Box 26, Dayton 9, Ohio.

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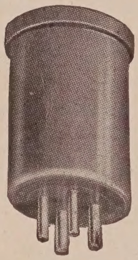
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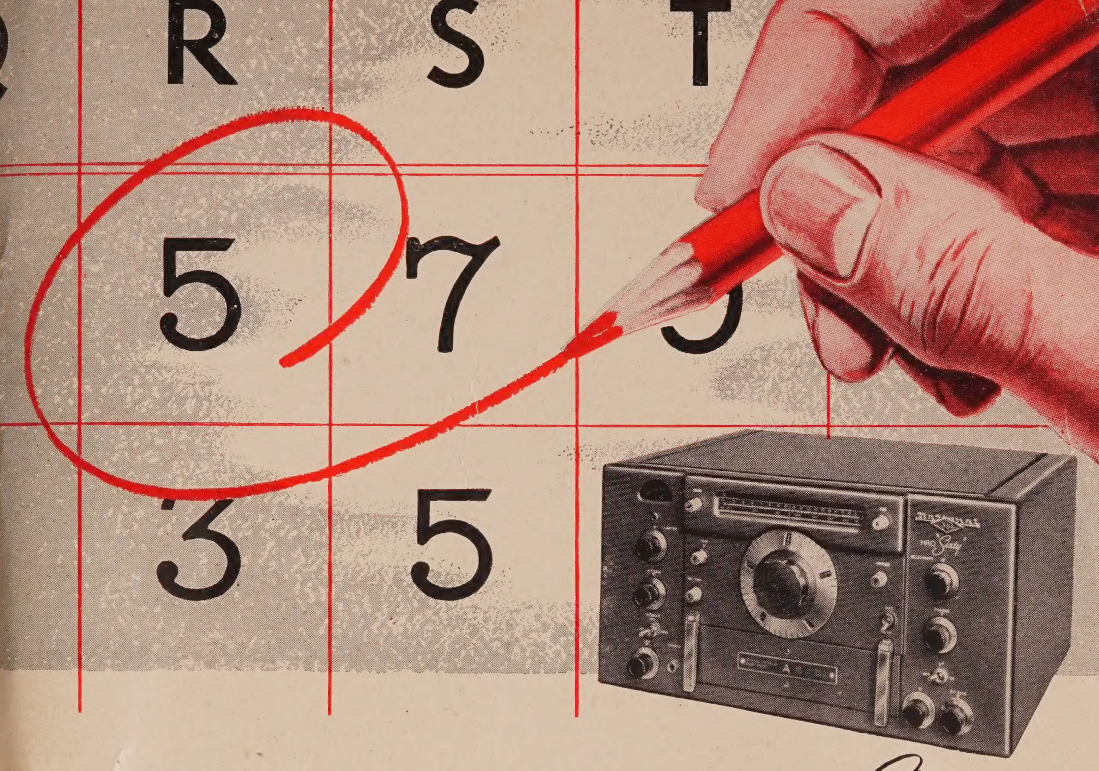

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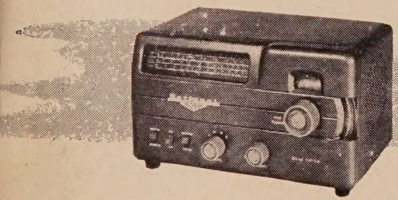

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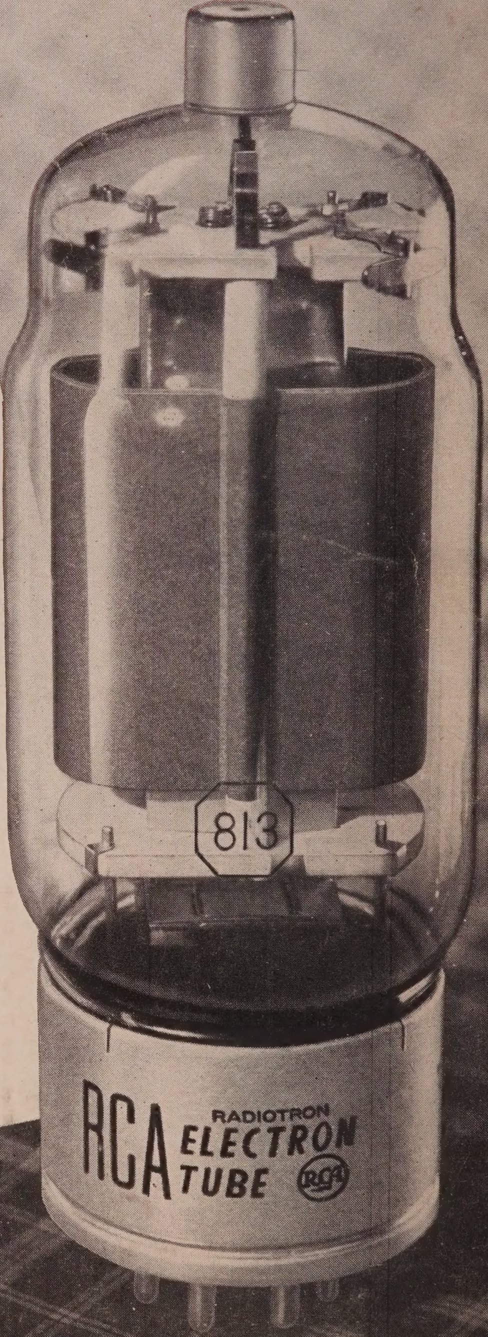

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